



FRIDAY, MARCH 28.

Train Accidents in February.

The following accidents are included in our record for the month of February:

COLLISIONS.

REAR.

On the night of the 2d a passenger train on the Chicago & Atlantic road ran into a freight train which was going into a siding at Hepburn, O. The engine and two freight cars were wrecked, the engineer fatally hurt and the fireman less severely injured.

On the morning of the 12th a freight train on the Cincinnati Southern road ran into a preceding freight near Rockwood, Tenn., wrecking several cars and killing a brakeman.

Early on the morning of the 18th a special passenger train on the Wabash, St. Louis & Pacific road ran into the rear of a freight train which was standing on the main track at Bingham, Ia., wrecking the caboose and three other cars and damaging the engine of the passenger train.

On the morning of the 14th a freight train on the New York Central & Hudson River road ran into a preceding freight which had stopped at Hudson, N. Y., for water. The engine was damaged, the caboose and two cars wrecked; the wreck caught fire and the damaged cars were destroyed. There was a dense fog at the time.

On the night of the 14th a passenger train on the New York, Pennsylvania & Ohio road ran into the rear of a preceding freight that had stopped on account of a broken coupling in Ashland, O., damaging several cars.

On the afternoon of the 16th a passenger train on the Buffalo, New York & Philadelphia road ran into a coal train which was going into a siding near Buffalo, N. Y., and several cars were wrecked.

Early on the morning of the 19th a freight train on the Pittsburgh, Cincinnati & St. Louis road ran over a misplaced switch and into some cars standing on a siding at Trenton, O. The engine and 21 cars were piled up in a very bad wreck. Three tramps, who were stealing a ride, were killed, and another one badly hurt. Four train men were also hurt.

On the morning of the 19th a passenger train on the Savannah, Florida & Western road ran into a preceding freight train, near Screven, Ga., doing some damage, and injuring two trainmen slightly.

On the evening of the 21st some cars of a freight train on the Lehigh & Hudson River road, which were being run upon the Y at Belvidere, N. J., by a flying switch, were not stopped in time and ran into some cars on the siding. Several cars were wrecked.

On the evening of the 21st a freight train on the Philadelphia & Reading road ran over a misplaced switch and into some cars standing on a siding in Wilkes-Barre, Pa., damaging the engine and several cars and injuring the engineer.

On the night of the 23d a freight train on the Cleveland & Pittsburgh road broke in two near Atwater, Ia., and the rear section ran into the forward one, wrecking several cars.

On the afternoon of the 26th a passenger train on the Shore Line Division of the New York, New Haven & Hartford road ran into the rear of a main line train near the station in New Haven, Conn. The rear car was damaged and a passenger who was on the platform was hurt.

On the evening of the 26th a freight train on the Lehigh & Hudson River road, which was being run into the station at Belvidere, N. J., by a flying switch, ran into some cars standing on the siding, and several cars were damaged.

On the evening of the 26th a passenger train on the New York, West Shore & Buffalo road ran into a freight train which was standing on the main track at Little Falls, N. Y. The engine of the freight was thrown over and the passenger engine was also badly damaged and several cars wrecked. It is said that the freight train sent out a signal, but the brakeman did not go far enough.

On the night of the 27th two engines and a snow plow on the St. Paul, Minneapolis & Manitoba road ran into a freight train near Crookston, Minn., piling up 14 box cars in a bad wreck. It was snowing very hard at the time.

On the morning of the 29th a passenger train on the Illinois Central road ran into the rear of a freight train at Tugaloo, Miss. The engine was damaged, a number of freight cars wrecked and the engineer killed.

On the morning of the 28th a coal train on the New York, Lake Erie & Western road ran into a preceding coal train in Lackawaxen, Pa., wrecking the caboose.

BUTTING.

On the afternoon of the 5th two cars broke loose from a freight train which was switching at Edgemont, Md., and ran back about four miles down a steep grade and into the head of a following freight train. The engine and the two runaway cars were damaged and one trainman hurt.

On the morning of the 6th on the Elizabethtown, Lexington & Big Sandy road there was a butting collision between a freight train and a construction train which was running backwards. The whole construction train, consisting of five empty flat cars and a caboose, was completely wrecked and four laborers were instantly killed and 13 badly hurt. It is said that the conductor of the construction train was running without orders and thought that he had time to reach Lexington, although he knew that the freight was due.

On the morning of the 7th there was a butting collision between two freight trains upon the Mobile & Ohio road near Whistler, Ala., caused by a mistake in orders. Both engines and several cars were wrecked and a brakeman badly hurt.

On the afternoon of the 7th there was a butting collision between two passenger trains on the Baltimore & Ohio road near Saltsburg, Pa. Both engines and a baggage car were badly wrecked and the conductor and three passengers hurt.

On the morning of the 9th there was a butting collision between two freight trains on the Chicago, Burlington & Quincy road, near Hawthorne, Ia. Both engines and several cars were wrecked, the conductor killed and the engineer badly hurt.

On the morning of the 10th there was a butting collision between two construction trains on the Baltimore & Ohio road at Zediker's Crossing, Pa. One engine and three cars were badly damaged.

On the night of the 11th a freight train on the Cincinnati Southern road broke in two on a heavy grade near Emory Gap, Tenn., and the detached cars ran back down the grade and into the head of a following freight. The engine and 15 cars were piled up in a very bad wreck and a brakeman was killed.

On the afternoon of the 14th there was a butting collision

between a passenger and a freight train on the New York, Pennsylvania & Ohio road in Akron, O. Both engines and several cars were damaged and three passengers hurt.

On the evening of the 14th there was a butting collision between a passenger train and a wild engine on the Detroit, Lansing & Northern road near Ionia, Mich. Both engines were damaged and three trainmen hurt.

Early on the morning of the 15th there was a butting collision between two freight trains on the Chesapeake & Ohio road near Covington, Va., caused by a mistake in orders. Both engines and several cars were damaged and the road blocked nearly all day.

On the morning of the 26th there was a butting collision between two passenger trains on the Louisville, Evansville & St. Louis road, in New Albany, Ind. Both engines were badly broken and three cars damaged.

About noon on the 28th there was a butting collision between a passenger and freight train on the Indianapolis & St. Louis road, near Paris, Ill. Both engines and several cars were wrecked, a fireman was killed, and both engines were badly hurt. It is said that the freight train was running without orders.

On the night of the 29th there was a butting collision between two freight trains on the Pittsburgh, Cincinnati & St. Louis road near Bowerstown, O., wrecking both engines and several cars and killing about 50 sheep.

CROSSING.

On the night of the 11th a freight train on the Indianapolis & St. Louis road ran into a Daaville, Olney & Ohio River freight at the crossing of two roads in Kansas, Ill., wrecking a caboose and injuring two trainmen who were in it.

DERAILMENTS.

BROKEN RAIL.

On the morning of the 6th a passenger train on the Carolina Central road struck a broken rail near Cumberland, N. C., and the engine and three cars were thrown from the track. The engineer and a brakeman were badly hurt.

On the night of the 6th a freight train on the Illinois Central road struck a broken rail near Freeport, Ill., and the caboose and seven stock cars were thrown down a very high bank. Three trainmen and seven passengers who were riding in the caboose were hurt.

On the morning of the 11th a passenger train on the Alabama Great Southern road struck a broken rail near Eutaw, Ala., and two cars were thrown from the track.

On the morning of the 12th a freight train on the Lebanon Springs Railroad struck a broken rail near Petersburg Junction, N. Y., and two cars were thrown from the track. The conductor was hurt.

On the night of the 13th a passenger train on the Burlington, Cedar Rapids & Northern road was thrown from the track near Cedar Rapids, Ia., by a broken rail, and eight passengers were slightly hurt.

On the night of the 12th a passenger train on the Wabash, St. Louis & Pacific road struck a broken rail near Staunton, Ill., and three cars were thrown from the track and upset in a ditch. The road was blocked all night.

On the morning of the 19th a passenger train on the Wabash, St. Louis & Pacific road struck a broken rail near Glenwood, Mo., and the rear car was thrown from the track and down a high bank, injuring six passengers.

Very early on the morning of the 23d, as a passenger train on the Hannibal & St. Joseph road was crossing a bridge near New Cambria, Mo., a broken rail threw the tender, baggage and smoking cars from the track, and the smoking car went off the bridge, falling into the water on one end. Two cars following the smoker were upset but not thrown over the bridge and both of them were badly wrecked. The bridge was also so badly damaged that it was necessary to rebuild it. One passenger was killed and 35 more or less seriously injured.

On the night of the 23d several cars of a freight train on the Chicago, Milwaukee & St. Paul road were thrown from the track near New Hampton, Ia., by a broken rail.

On the afternoon of the 25th a passenger train on the Grand Trunk road struck a broken rail near Iroquois, Que., and four passenger cars were thrown from the track, injuring two passengers seriously and five others slightly.

BROKEN BRIDGE.

On the afternoon of the 14th a mixed train on the Southern Central road went through a bridge over the Seneca River near Weedsport, N. Y. The engine and two freight cars went down into the river, and the engineer, fireman and a brakeman were carried down and drowned. The accident was caused by the high water which had washed out the foundation of one of the abutments.

On the morning of the 23d a trestle bridge on the Alabama Great Southern road at Big Sandy, Ala., gave way under a freight train. The engine passed over, but nine cars went through the bridge and were wrecked.

On the afternoon of the 27th a freight train on the Grand Trunk road broke through a bridge near Fredericksburg, Ont., and 11 cars went down into the creek.

SPREADING OF RAILS.

Early on the morning of the 7th the engine and six cars of a freight train on the Mobile & Girard road were thrown from the track near No. Five, Ala., by the spreading of the rails.

On the morning of the 7th the engine and one car of a passenger train on the Emmetsburg Railroad was thrown from the track near Rocky Ridge, Md., by the spreading of the rails.

On the afternoon of the 7th the engine and several cars of a freight train on the New York, Lake Erie & Western road were thrown from the track near Livonia, N. Y. by the spreading of the rails.

On the morning of the 14th eleven cars of a freight train on the Rome, Watertown & Ogdensburg road were thrown from the track near Walcott, N. Y., by the spreading of the rails.

On the night of the 24th several cars of a freight train on the Texas & Pacific road were thrown from the track near Baldwin, Tex., by the spreading of the rails.

On the afternoon of the 26th two cars of a passenger train on the St. Johnsbury & Lake Champlain road were thrown from the track near Hardwick, Vt., by the spreading of the rails. One of the cars upset and a passenger was slightly hurt.

BROKEN AXLE.

On the night of the 13th two cars of a freight train on the Pennsylvania Railroad were thrown from the track near Downingtown, Pa., by a broken axle.

On the night of the 28th two cars of a passenger train on the Indiana, Bloomington & Western road were thrown from the track near Columbus, O., by a broken axle.

ACCIDENTAL OBSTRUCTION.

On the morning of the 6th a passenger train on the Baltimore & Ohio road ran into a large rock which had fallen on the track in a cut at Town Creek, Va. The engine was thrown from the track and wrecked and two cars damaged. A passenger was hurt.

On the night of the 6th a passenger train on the New York & New England road struck a large rock which had fallen on the track near Marlboro, Conn., and the engine

and baggage car were thrown from the track and went down a high bank. Three trainmen were seriously hurt and five passengers were slightly injured.

On the night of the 12th a passenger train on the International & Great Northern road ran into a tree which had blown down across the track near Palestine, Tex., and an engine and one car were thrown from the track.

On the night of the 14th a passenger train on the Baltimore & Ohio road struck a stone which had fallen from the roof of the tunnel at Board Tree, W. Va. The engine and three cars were thrown from the track and the tunnel was blocked all night by the wreck.

On the morning of the 17th as a freight train on the Texas & Pacific road was near Longview, Tex., a drawhead pulled out and fell on the rails throwing three cars off the track. The conductor was killed and brakeman very badly hurt.

On the night of the 20th a passenger train on the Michigan Central road struck a tree which had been blown across the track near Buena Vista, Mich., and the engine was thrown from the track.

On the evening of the 23d a coal train on the West Virginia Central & Pittsburgh road struck a large rock which had rolled upon the track near Piedmont, W. Va., and the engine and five cars were thrown from the track.

On the morning of the 23d as a milk train on the New York, Susquehanna & Western road was running through a cutting near Ogdensburg, N. J., a large stone from the bank rolled down on the rails, throwing three cars from the track.

On the morning of the 26th as a passenger train on the St. Louis, Iron Mountain & Southern road was near Williamsville, Mo., a very large rock rolled down the bank and struck the engine, knocking it from the track and wrecking it badly. The baggage car followed the engine off the track and the engineer was slightly hurt.

CATTLE.

On the evening of the 3d a passenger train on the Mississippi & Tennessee road ran over some cattle near Memphis, Tenn., and was thrown from the track. The express agent was badly hurt.

About noon on the 6th a construction train on the Louisville, New Orleans & Texas road, while running backward near Port Gibson, Miss., ran over a cow, throwing two cars from the track. One laborer was injured and thirteen hurt.

LANDSLIDES AND WASH-OUTS.

On the night of the 2d a freight train on the Southern Pacific road ran into a landslide near Cameron, Cal., and the engine and five cars were thrown from the track.

On the evening of the 3d a passenger train on the Denver & Rio Grande road ran into a wash-out near Ogden, Utah, the engine going down into the gap on its side with the mail car on top of it. The engineer and fireman were hurt, and the mail agent so badly injured that he died a few days afterward.

On the morning of the 8th a freight train on the Galveston, Sabine & St. Louis road ran into a landslide near Easton, Tex., and was thrown from the track.

On the night of the 11th a freight train on the Pennsylvania Railroad ran into a landslide near Blairsville Intersection, Pa., and several cars were thrown from the track.

On the night of the 12th a passenger train on the Texas & Pacific road ran into a wash-out near Ranger, Tex., and was badly wrecked.

On the morning of the 14th a freight train on the Syracuse, Binghamton & New York road ran into a landslide near Chenango Forks, N. Y., and the engine, tender and several cars went down a high bank into the Susquehanna River. The engineer was caught under the engine and killed.

SNOW OR ICE.

On the evening of the 5th a locomotive and snow plow on the Central Pacific road ran off the track near Cold Stream, Cal., blocking the road several hours.

On the night of the 17th a passenger train on the Chicago & Northwestern road was thrown from the track in La Crosse, Wis., and the engine upset. The accident was caused by ice collecting between the rails and the planks at a street crossing.

WIND.

On the morning of the 23d two cars of a passenger train on the Union Pacific road were blown from the track by a tornado near Georgetown, Col. The cars were thrown over into a ditch and badly damaged, and five passengers were slightly hurt.

MISPLACED SWITCH.

On the morning of the 1st the engine and two cars of a passenger train on the Gulf, Colorado & Santa Fe road were thrown from the track at Virginia Point, Tex., by a misplaced switch. The express messenger was slightly hurt.

On the night of the 1st nine cars of a freight train on the New York, New Haven & Hartford road were thrown from the track in New London, Conn., by a misplaced switch.

On the morning of the 3d the engine and several cars of a freight train on the Texas & Pacific road were thrown from the track at Alexandria, La., by a misplaced switch.

On the morning of the 5th a car of a passenger train on the Manhattan elevated road was thrown from the track at the City Hall station, in New York, by a misplaced switch.

On the afternoon of the 5th five cars of a freight train on the Central Pacific road were thrown from the track at Merced, Cal., by a misplaced switch.

On the morning of the 11th the engine of a freight train on the Central Pacific road was thrown from the track in Oakland, Cal., by a misplaced switch, and went off the wharf into the water.

On the afternoon of the 14th a passenger train on the Northern Pacific road was thrown from the track in St. Paul, Minn., by a misplaced switch.

On the morning of the 16th the engine of a freight train on the Chicago, Burlington & Quincy road was thrown from the track in Aurora, Ill., by a misplaced switch. A fireman was hurt.

On the evening of the 19th the engine and one car of a passenger train on the Lackawanna & Pittsburgh road were thrown from the track in Friendship, N. Y., by a misplaced switch. The fireman and a passenger were hurt.

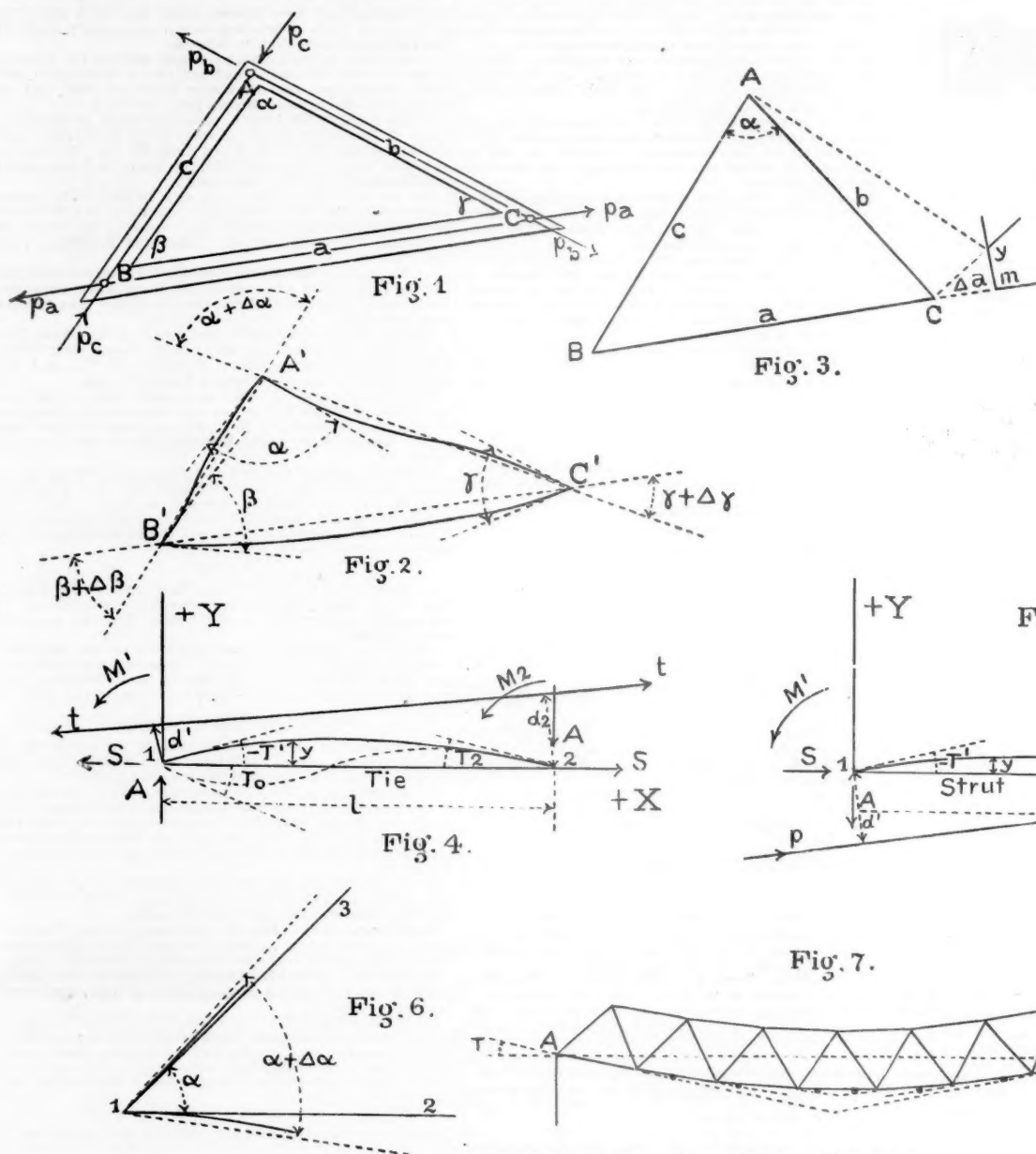
On the morning of the 23d the engine of a freight train on the Green Bay, Winona & St. Paul road was thrown from the track at Onalaska, Wis., by a misplaced switch.

On the evening of the 27th the engine of a passenger train on the Indianapolis & Vincennes road was thrown from the track near Indianapolis, Ind., by a misplaced switch.

OPEN DRAW.

On the morning of the 7th a draw-bridge over the Brandywine River in Wilmington, Del., on the Philadelphia, Wilmington & Baltimore road was opened to allow a vessel to pass through. Signals were set for trains, but owing to some reason, probably to fog, the engineer of a passenger train did not see them until close to the bridge. He at once put on brakes and the bridge-tender commenced turning the draw, but there was not time to close the draw entirely and the engine ran over the draw upon the ties in such a position that it took some time to get the track clear.

Early on the morning of the 23d the engine of a freight



SECONDARY STRAINS ON STATICAL STRUCTURES.

train on the Chicago & Northwestern road went through the open draw of a bridge in Milwaukee, Wis. The engine went down into the river. The bridge-tender claims that the proper signals were displayed, but the engineer says that he did not see them.

MALICIOUSLY CAUSED.

On the night of the 3d a passenger train on the Texas & St. Louis road was thrown from the track near Pittsburg, Tex., by a tie which had been wedged in the cross ties on a bridge. The tie had evidently been placed there purposely. On the night of the 17th an attempt was made to wreck the east-bound night express on the Cleveland, Columbus, Cincinnati & Indianapolis road at Moorefield, O., by turning a switch. The engine left the track and turned over, dragging the postal and baggage cars after it, but no one was hurt.

UNEXPLAINED.

On the afternoon of the 11th a car of a freight train on the Meadville & Louisville road ran off the track at Reitz's Cut, Pa., blocking the road a short time.

On the evening of the 13th the engine and one car of a passenger train on the New York & New England road ran off the track near Towantic, Conn., and the engine went down a bank. The fireman was fatally injured and the engineer less severely hurt.

On the morning of the 14th the caboose of a coal train on the St. Louis Coal road was thrown from the track near Weige, Ill., and upset, injuring two trainmen.

On the morning of the 14th a passenger train on the Chicago & Alton road ran off the track near Bates City, Mo., all the cars leaving the rails.

On the afternoon of the 15th three cars of a freight train on the Connecticut River road ran off the track at Chicopee Junction, Mass., blocking the road two hours.

On the morning of the 16th the engine of a passenger train on the New York, New Haven & Hartford road ran off the track near Stamford, Conn., and was slightly damaged.

On the morning of the 17th a freight train on the St. Louis, Iron Mountain & Southern road ran off the track near Arkadelphia, Ark., blocking the road five hours.

On the morning of the 20th a car of a freight train on the New York, Lake Erie & Western road ran off the track at Pine Grove, Pa., blocking the road two hours.

On the morning of the 20th a baggage car of a passenger train on the Canada Southern road jumped the track near Buxton, Ont., and the car was thrown over and considerably damaged.

On the night of the 20th, near Stairway, N. Y., on the New York, Lake Erie & Western road, a loaded coal dump in the centre of a freight train jumped the rails, clearing the rest of the train, and, mounting the west bound track, dumped itself on the outside of it in the ditch. The train ran together again without a jar and the accident was only discovered by the steps of the caboose scraping against the derailed dump as it passed by. Had a westward train been passing at the time a serious wreck would probably have resulted. Had not the men in the caboose discovered the

dump on the westward bound track as they passed by, it would have been left there by the train, as no one knew that it had left the track.

On the afternoon of the 21st a car of a freight train on the Connecticut River road ran off the track at Chicopee, Mass., and upset.

On the afternoon of the 21st a freight train on the Central Pacific road ran off the track in a snow-shed at Emigrant Gap, Cal., knocking down the shed for some distance and wrecking several cars.

On the morning of the 27th the engine of a freight train on the Canada Southern road ran off the track at Montross, Ont., and was slightly damaged.

On the evening of the 28th two cars of a freight train on the New York Central & Hudson River road ran off the track in Rochester, N. Y., blocking both tracks for two hours.

On the night of the 29th two cars of a freight train on the New York, Lake Erie & Western road ran off the track near Port Jervis, N. Y., and upset, killing a number of cattle.

OTHER ACCIDENTS.

BOILER AND CYLINDER EXPLOSION.

On the morning of the 25th, as a freight train on the Chicago, Burlington & Quincy road, was nearing Cedar Creek, Neb., the engine burst a flue in the boiler, the steam blowing back into the cab and filling it. The engineer was badly scalded, but managed to stop the train.

On the evening of the 7th the engine of a passenger train on the Manhattan Elevated road blew out a cylinder-head when near Third avenue and Ninety-sixth street, in New York. The engine was disabled and the road blocked for nearly an hour.

On the morning of the 18th the engine of a passenger train on the International & Great Northern road blew out a cylinder-head when near Laredo, Tex., and the train was detained until a messenger could reach a telegraph station.

BROKEN AXLE.

On the night of the 9th the engine of a local passenger train on the Wabash, St. Louis & Pacific road broke a driving axle when near Grafton, Ill., but did not leave the track.

On the night of the 26th a wild engine on the Chicago & Northwestern road broke a truck axle when near Sterling, Ill., but did not leave the track. The axle broke close to the wheel and the break was caused by the heating of the journal.

On the morning of the 28th the engine of a passenger train on the Boston, Concord & Montreal road broke a driving axle near Warren, N. H., but did not leave the track.

BROKEN WHEEL.

On the afternoon of the 5th the engine of a freight train on the New York Central & Hudson River road broke a tender wheel when near Rochester, N. Y., but was not thrown from the track.

On the morning of the 6th the engine of a passenger train on the New York, New Haven & Hartford road broke the

tire of a driving wheel while passing through New Haven, Conn., but did not leave the track.

SUMMARY.

This is a total of 110 accidents, in which 22 persons were killed and 150 injured. As compared with February, 1883, there was a decrease of 74 accidents, of 39 killed and of 36 injured.

The two months of the current year to the end of February show a total of 257 accidents, 78 killed and 390 injured. This is a monthly average of 129 accidents, 39 killed and 105 hurt, February being considerably below the average.

Contributions.

Secondary Strains of Statical Structures.

I.

The strains in statical structures which are caused by the rigidity of the joints are termed "secondary strains." They are the result of flexures, are changeable from point to point, and it is not very easy to study their values by experiments. Indeed, the only instrument which might answer this purpose, if not too sensitive, is that invented by C. E. Stromeyer; but, so far as the writer knows, it has not yet been tried for this purpose. This instrument is known to be constructed on the principle of Newton's rings. Its base line for measurement is only about 3 in. long.

Engineers are in possession of experiments on the strength of plate girders, but there are no experimental results regarding the breaking strength of open trusses or of riveted lattice girders. There are, so far as the writer knows, only experiments on the primary strains of the Rhine bridge at Arnheim, and the Waal bridge at Nymroegen, made by Dutch engineers with the apparatus of Ch. Manet, of Paris; and others by Professor Traenkel with his own measuring instrument. These experiments do not refer to secondary strains.

The strains arising from rigid connections in many instances are, however, very considerable indeed. Even plate girders of the best design and manufacture cannot possibly yield the exact full strength calculated from the theory of flexure of solid beams of simple cross-section, for their parts are not connected atom by atom, but only at certain distances by more or less imperfect rivets or bolts. The real strength of experimental plate girders consequently varies

elastic curve. And supposing them to be known, at least an equation can be formed in which M_1 , S and A appear, and which expresses the law of that curve. It must pass through the given points 1 and 2. This equation being constructed, the tangential angles T_1 and T_2 can be expressed. This gives two equations, each containing the quantities T_1 or T_2 , M_1 , S and A . From these two equations A can be eliminated. The equation which remains contains S , but S can be considered equal to the primary strain of the member, and there is:

$$M_1 = K T_1 + L \times T_2.$$

The coefficients K and L contain the known quantities E , I and S , and the length l of the member. There is a separate set of K and L , according as the member is a tie or a strut.

It may be seen from the values for K and L at the end of the paper that they are proportional to $\frac{EI}{l}$ or, since E is assumed to be a constant quantity, K and L are proportional to $\frac{I}{l}$.

Besides, formula (1) shows that K and L are moments of flexure, for T_1 and T_2 are very small abstract fractions. Indeed, l being an expression of four dimensions, and being divided by l , represents three dimensions. Of these three take two, forming a surface, and nullify this surface by E , which is a weight per square unit, and a force is obtained of the same nature as t (or p). This force multiplied by the remaining third dimensions gives a moment.

The results obtained may be interpreted, and important conclusions may be drawn.

If in a point, for instance the end point, of a truss two members are connected, one will be acted upon by the moment M_1 , and the other by the resisting moment M_1 .

If the angle α is increased by $\Delta\alpha$ (see fig. 6), the curves of the members 1-2 and 1-3 at 1 must still preserve the angle α . If 1-2 is weaker as to flexure than 1-3, it will contribute most toward making up the difference of α . For equation (1) teaches that if K and L are small (flexible member), T_1 and T_2 must be great to produce M . Hence the greater the number of those members of a truss which are flexible, or which have small moments of inertia, the greater will be their angles T ; the less, consequently, will be the angles T of the stiff members of the truss, which cannot bear great curvature without great strains. These rigid members are those which, to be safe against crippling, must be kept as straight as possible; their angles T must be kept small.

The flexible tension members will be their protectors. Hence the practice of designing tensional members as narrow eye-bars is favorable to the reduction of secondary strains in the very stiffly designed compression members of the same structures.

Secondly, it is good practice to use long panels. For the longer the panels, the greater the lengths l of the members, and consequently the smaller K and L will become.

The writer always advocated long panels, and he has used them, 10 years ago, nearly 20 ft. long in spans of 100 ft. length, and 11 years ago, 19 ft. long in a span of 152 ft. At that time the advantages of long panels were so little understood that at a bridge-letting a "bridge expert" denounced the writer's plan because it had "no panels." At another letting a good design was simply ignored and shelved for the same reason, though the proposal was commercially the most favorable among a very great number of others. The design yielding the greatest percentage of secondary strains received the award.

Thirdly, the less the deflections of a truss, other things being equal, the smaller will be the sums of alterations of angles at each joint-point. This sum of alterations of angles at each joint-point is made up by the angles of flexure T of the members meeting at this point. The less the sum, the less will also be the share of each member in making it up. In other words, the less will be the moments M and the corresponding secondary strains. It is, therefore, good practice to build trusses as deep as possible. As regards great depths, American practice for a time was ahead of the most economical design on the Continent.* In regard to careful design of lateral bracing and attachment of floors, the best Continental examples are still in advance. Great lateral stiffness is not independent of great vertical stiffness, and conversely. A great depth of bridge can be used if it is made sufficiently wide, if the lateral and oblique bearing are carefully calculated, are carefully proportioned, and if the wind braces pass as exactly through the true joint-points as do the other members of the bridge.

The tangential angles of deflection at the ends A and B of a truss (see fig. 7) are equal to each other if the truss is of symmetrical form and is symmetrically loaded. These two angles together are equal to the sum of alterations of the total joint angles at one of the chords. The greater the angle T , the more the truss will suffer from secondary flexures. But the distribution of these angles over the different joints, especially the top joints of an ordinary truss, in each of which (except at the ends) there meet three stiff compression members and only one tensional member, is an important element. If in a pair of corresponding top-chord joints a sudden or considerable increase of the sum of the angles takes place, these are the points where great extra strains must be expected. In girders with vertical posts and parallel chords this happens near the centers of the top chords. The alterations of the joint-angles of a fully loaded parabolic

bow-string girder are very uniform, which is favorable to more equally distributed secondary strains.

CHARLES B. BENDER.

APPENDIX.

For tension (see fig. 4) there is the equation:

$$EI \frac{d^2y}{dx^2} = Ax + Sy - M_1.$$

which integrated gives:

$$EIy = \frac{ax^2}{2} + \frac{bx}{2} - \frac{Ax}{t^2} + \frac{M_1}{t^2}$$

where e is the number 2.71828.

For $x = 0$ there is $y = 0$, for $x = l$ there is $y = 0$, so that a and b are fixed.

For compression (see fig. 5) there is the equation:

$$EI \frac{d^2y}{dx^2} = -Ax - Sy - M_1$$

which integrated gives:

$$EIy = a' \sin. xt + b' \cos. xt + \frac{Ax}{t^2} + \frac{M_1}{t^2}$$

For $x = 0$ there is $y = 0$, for $x = l$ there is $y = 0$, so that a' and b' are fixed.

Each of the equations is now treated as follows:

Differentiate once and remember that for

$$x = 0 \text{ there is } \frac{dy}{dx} = T_1, \text{ and for } x = l \text{ there is } \frac{dy}{dx} = T_2.$$

Eliminate between the two equations so gained the value A and the result is equation:

$$\frac{M_1}{M_2} = \frac{KT_1 + LT_2}{KT_2 + LT_1} \quad (1)$$

The values of K and L are, for tension members:

$$K = \frac{EI}{l} \left(4 + \frac{2}{15} \frac{S^2}{t^2} - \frac{11}{6,300} \frac{S^4}{t^4} \dots \right) \quad (2)$$

$$L = \frac{EI}{l} \left(2 - \frac{1}{30} \frac{S^2}{t^2} + \frac{1}{12,600} \frac{S^4}{t^4} \dots \right)$$

For compression members:

$$K = \frac{EI}{l} \left(4 - \frac{2}{15} \frac{S^2}{t^2} - \frac{11}{6,300} \frac{S^4}{t^4} \dots \right) \quad (3)$$

$$L = \frac{EI}{l} \left(2 + \frac{1}{30} \frac{S^2}{t^2} + \frac{1}{12,600} \frac{S^4}{t^4} \dots \right)$$

and there is $\frac{S}{EI} = \frac{S}{EI}$ and $\frac{S}{EI} = \frac{S}{EI}$

If a triangle has the sides a , b , c , with the angles α , β , γ , opposite to these sides, and if these sides increase by Δa , Δb , Δc , which are very small quantities, from the well-known equation:

$$a^2 = b^2 + c^2 - 2bc \cos. \alpha$$

by differentiation and an easy transformation the formula is prepared:

$$\Delta\alpha = \cotang. \beta \left(\frac{\Delta a}{a} - \frac{\Delta c}{c} \right) + \cotang. \gamma \left(\frac{\Delta a}{a} - \frac{\Delta b}{b} \right) \quad (4)$$

in which the differences must be introduced as negative quantities if they are due to compression. Manderla's theory of calculating the secondary strains must be used only where the primary strains calculated are already very near the true strains. If, for instance, a two-panel truss with a deep continuous beam as top chord is to be investigated, it will be necessary to treat this truss as a combination of the continuous beam with a yielding middle support. Thereupon the moment of flexure at the middle point of the beam is found, and then only Manderla's formulae can be employed.

(TO BE CONTINUED.)

Track Problems.

TO THE EDITOR OF THE RAILROAD GAZETTE:

An old engineer sometimes finds questions of track location coming up from time to time for rediscussion which were cardinal principles when he began. Not long ago an elaborate argument *pro* and *con*, occurred on frog distances, in which the most important feature was neglected, viz., the use of a short tangent entering and leaving the frog, without which no turn-out is properly laid.

Thirty years ago no assistant was permitted, under the best engineers of that day, to lay out a curve without carefully spreading the rails, to allow for the necessary pivoting of the car, in a case where the traction on the link tends to throw the hind truck out and the forward truck inward. On street cars with about 8 ft. wheel-base this play is not less than $\frac{1}{4}$ to $\frac{1}{2}$ in. on 60 to 75 ft. radii, as I have frequently found. A similar action occurs with longer cars, and if more care were taken to provide for this necessary leverage there would be much less wear of Bessemer rails on curves, and less elevation of outer rails would be needed.

Your demonstration, on page 205, of the play of $\frac{1}{4}$ in. for car truck, 33 ft. between centres, with 7 ft. wheel-base, on 10° curves, is a valuable illustration of this action as between the trucks, but there is also a pivotal throw of the hind trucks to be compensated, and both are best met by the simple change of gauge, which involves no risk whatever, though it does involve special oversight of track layers.

This becomes more important in view of another rule, much neglected, in the gauge of car wheels, which should be much closer than usually made, to relieve the rails and rolling stock from injurious lateral play. As our superstructure becomes more perfect, steadiness of motion should be more carefully secured, and with closer gauge of wheels the spread of curved tracks can be adjusted accordingly. The same theory by which we narrow the gauge in crossings,

and on carefully built bridges, applies to the whole track, though it cannot be so rigidly enforced at present.

SAMUEL MCELROY, C. E.

No. 170 Broadway, New York.

[We think Mr. McElroy is right in saying that the best laid turn-outs are slightly eased in curvature near the frog-joint, although one can hardly say there is a tangent of measurable length. Given the head-block and frog, it is largely a matter of eye to lay down the intermediate curve, and we think it may safely be left so. It is not true, even theoretically, that two or three feet, more or less, in leads of ordinary length injures the perfection of the curve for the purpose required.]

As to a coupling-link tending to throw the front truck in and the rear truck out on curves: the "lateral component," or force tending to drag the car inward at the coupling, is about 1,600 lbs. with a 50 ft. car on a 10 degree curve. The force required to slide the wheels sidewise on the rails, whether standing still or rolling, is about one fourth of the load on them, or say 7,500 lbs. Consequently this force could not slide the wheels even if applied directly to them instead of with unfavorable leverage. A much less force might change their direction of motion if properly applied to them, as on a street car, but not when applied through a centre-pin. Hence no widening of gauge is required for this reason. Our demonstration on page 205, to which our correspondent refers, had also no reference that we can perceive to the question of widening gauge, but simply stated that the necessary play in a check-chain was only $\frac{1}{4}$ in. on a 10 degree curve when there was no play between flange and rail.

We think Mr. McElroy is right in respect to leaving over-much play in car-wheels, although it is a disputed point, and too much play is probably less dangerous than too little. The Pennsylvania system adheres to and perpetuates a gauge $\frac{1}{4}$ in. wider than the standard, consequently it is obliged to leave a large play in order that its cars may run on 4 ft. 8 $\frac{1}{2}$ in. gauge. Consequently, it is not now allowing any extra play on gauge. The Lake Shore road also allows very liberal play, although of standard gauge. Otherwise than this, the tendency is to allow about $\frac{1}{4}$ in. play with $\frac{1}{4}$ in. more on curves, and this we should regard as about right, although it is a practice on one or two other lines, we are assured, to allow no extra play at all on curves. One excuse for this might be that the flange wear alone speedily widens the gauge.

Is it true that gauge is narrowed in crossings and on bridges? We are not aware of it.—EDITOR RAILROAD GAZETTE.]

Car Wheels—Straight vs. Taper Wheel Fits.

A meeting of the Master Car-Builders' Club was held in New York March 20. The President, Mr. Leander Garey, announced that the subject for discussion was one continued from the meeting of Jan. 17—"Car Wheels and Axles, including the Fitting of the Wheels to Gauge on Axles."

The President: I have here a report of the Lake Shore & Michigan Southern Railway, showing the service of wheels on that road, principally cast-iron chilled wheels. Some of them make a very large mileage: one here is quoted as making 231,743 miles, another 183,841 miles, another 112,681, another 146,372, another 106,500. The general average of wheels is stated here as 57,166 miles, this for 33-in. wheels under engine, tender and passenger equipment. The 30-in. wheels make a general average of 56,486 miles, 28-in. wheels a general average of 53,578, 26-in. an average of 57,953.

The general average of 33-in. wheels worn out in five years is 72,055 miles, 30-in. wheels 49,533 miles. I would like to know if wheel manufacturers consider an increase in the weight of wheels necessary. Some roads are now using 33-in. wheels weighing 600 lbs. One road using the 600-lb. wheels has not had a failure during the past winter from any cause that could endanger safety. The record kept for 30 days on several of the trunk lines years ago as to wheels broken in service showed about 90 per cent. to be due to cracked plates. Our cast-iron wheels have not enough metal in them for the service required.

No remarks being made, the President said: If we cannot get any expression of opinion on wheels, we will pass to the next subject, which is the fitting of wheels to gauge on the axles. Some days ago I addressed a circular letter to several parties throughout the country, asking them to give me their opinion as to the fitting of wheels to gauge of axles, referring more especially to the straight and taper fitting. This was called out by the action taken by the New England Club at their last meeting, at which time I think the general voice there was in favor of fitting wheels with a tapering fit on the axles.

The following letters were then read on the subject of taper versus straight wheel fits.

Mr. KIRBY (Lake Shore & Michigan Southern) preferred a straight fit, as being cheaper to turn accurately, and not so liable to burst the wheels.

Mr. V. H. KOHLER (Wabash) said his experience had been that a straight fit was superior to a taper fit, as a wheel may be moved on the former, and yet remain tight, while on a taper fit it is liable to become loose.

Mr. JOHN P. LEVAN (Pennsylvania) had always found the straight wheel fit the safest and best.

Mr. W. McWOOD (Grand Trunk) had always turned the wheel fit parallel, and used a pressure of from 25 to 35 tons, and rarely had a loose wheel.

Mr. FORSYTH (Chicago, Burlington & Quincy) was decidedly in favor of a straight fit, because experiments show that if a wheel put on at 40 tons be moved $\frac{1}{4}$ in. or $\frac{1}{2}$ in. there is still a pressure of 35 to 38 tons to hold it. With a taper fit the pressure is reduced so rapidly that the wheel becomes loose. It takes greater skill to turn a taper fit, and consequently wheels are oftener loose, or burst than with a straight fit. Careful experiments show:

* Depths of one-sixth of the span for bridges over 300 ft. long and panels of 18 ft. length are quite the rule now in Germany and Holland.

1. The maximum pressure required to start a wheel from its seat is from 2 to 5 tons greater than that required to force it on.

2. There is a more rapid reduction of pressure at corresponding points in pressing off a rough turned axle than a smooth one.

3. This reduction of pressure increases with the roughness of the axle. It is necessary, therefore, to use a higher pressure, and put a greater strain on the wheel in order to obtain corresponding resistance through the whole length of the wheel seat in forcing off with a rough axle than with a smooth one. The best wheel fits at the same maximum pressure are therefore made with a smoothly turned wheel seat on the axle.

Experiments show that wheels give more resistance to twisting on their axles than to being drawn off, and smooth axles give more resistance than rough axles. A smoothly-turned parallel wheel seat, therefore, best resists both direct and torsional pressure.

The above writers are all in favor of the straight fit, but the following letters take the other side of the question:

Mr. R. MILLER (Michigan Central) adopts a taper of $\frac{1}{16}$ in. in the length of the hub, boring with a reamer. Can use second run axles without refitting, and have not had one loose wheel in last eight years.

Mr. W. B. SNOW (Illinois Central) has always used a tapering fit of $\frac{1}{16}$ inch in $6\frac{1}{4}$ inches, and presses on with a maximum of 35 tons and a minimum of 25 tons, and has

there were 1,199 wheel failures recorded, but the tire left the wheel in only 8 cases.

Mr. NEALE: The failures enumerated by the Board of Trade include every case where a wheel appears unsafe. Defects rarely occur on passenger stock, but are generally found on private owners' coal cars, which are roughly built and little looked after. The most usual wheel defect is a circumferential split in a badly welded wrought-iron tire.

Mr. WHITNEY: The centres of locomotive drivers are made of anthracite iron, which shows that the strain on the centre is small.

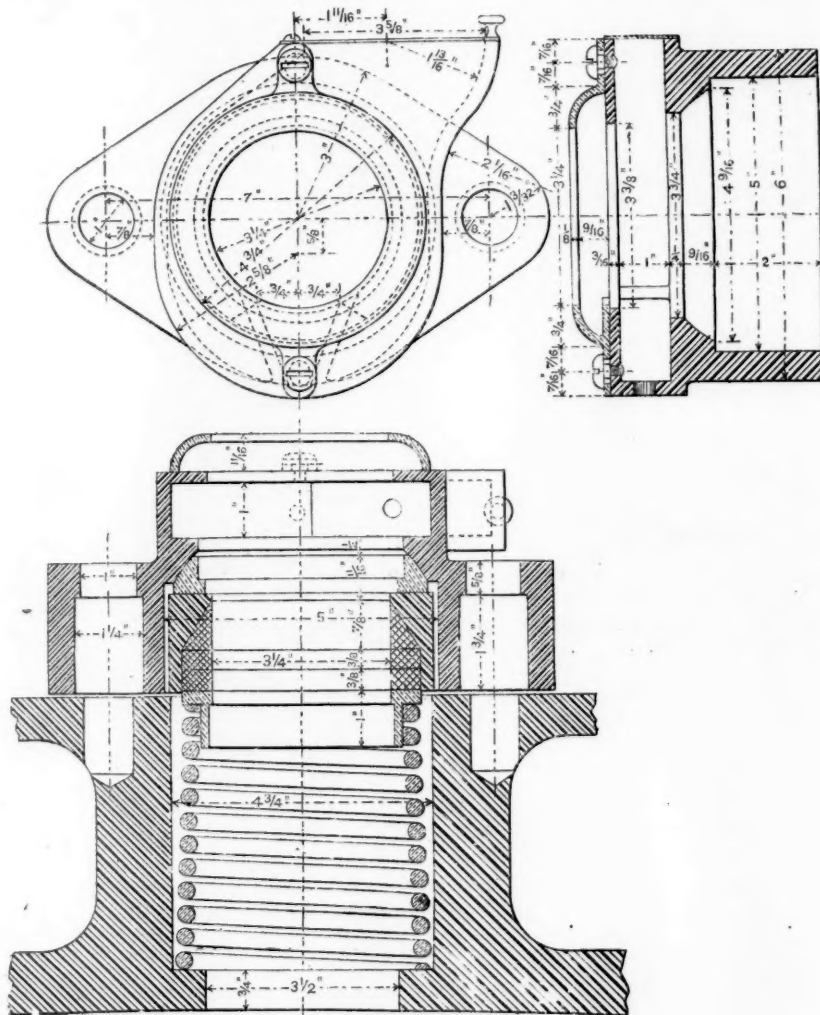
The PRESIDENT: About 95 per cent. of the wheels removed in this country are simply cracked, though termed broken. The 5 per cent. average was probably obtained by taking a severe winter month. The large percentage of wheels removed which are cracked in the plate shows that a heavier plate is required, and then possibly more metal must be added to rim and hub.

Master Mechanics Association Circulars.

The following circular to members of the Master Mechanics' Association has been issued by the Committee through the Secretary's office:

CONING THE TREAD OF WHEELS.

The undersigned, your Committee on Coning the Tread of



HOFFMASTER & ARTHUR'S PISTON-ROD LUBRICATOR.

had no loose wheels, but considers a straight fit might give equally good results.

The PRESIDENT then stated that the Philadelphia & Reading Co. uses a straight fit.

Mr. C. A. SMITH understood that the general adoption of the straight fit was agreed upon some years ago.

Mr. LENTZ: The Lehigh Valley Railroad has always preferred the straight fit.

Mr. WHITNEY considered uniformity desirable on economic grounds.

The PRESIDENT: The evidence is decidedly in favor of straight fits. Experiments show that there is a serious difficulty in pressing wheels on with a certain pressure to gauge with taper fits. The question as to the proper weight of wheels remains unanswered. If the present wheels are too light more metal ought to be added to prevent them cracking in the plates.

Mr. WHITNEY had nothing to say on this subject, but had some figures as to the percentage of broken wheels in this country. The Railroad Gazette estimated that 5 per cent. of all the wheels in the country broke every year, but records kept by the Pennsylvania Railroad show a much lower proportion.

Mr. BRADY asked the cost of the Pennsylvania wheels made at Altoona. They were rather steel than cast-iron wheels.

Mr. WHITNEY: About 10 per cent. of steel is used. Mr. Ely believes their wheels are cheaper to use than steel-tired wheels. Two years ago the 28-in. wheels under 20-ton freight cars weighed 525 lbs.

Mr. ELLIS: Chilled wheels fail from a great variety of causes, while steel-tired wheels in England are generally removed because the tire is worn out. There is seldom any defect in the wheel centre.

Mr. NEALE: In England passenger wheels last about three years between each turning, and freight car wheels seven years. The statement in the Railroad Gazette refers to the average of the whole country—good, bad and indifferent wheels. Chilled wheels appear more apt to flatten than steel tires.

Mr. BRADY: Railroad accidents are thoroughly investigated in England by Board of Trade inspectors, and consequently the number of accidents is diminished. In 1882

Wheels, respectfully solicit replies to the following questions:

1. Do you use cone tread wheels, and to what extent?
2. Do you use any with straight tread, or any portion of tread straight—if so, please describe?
3. How much taper to the inch in diameter of wheel do you use, and how much would you recommend?
4. If you recommend straight tread, would you turn them straight wholly, or cone outer edge, and to what extent?
5. Do you think there is any benefit derived in coning wheels for curves?
6. What has been your experience as to the difference in mileage or durability between straight and cone-tread wheels of same quality and similar service?
7. If consistent, send drawings of both straight and cone-tread wheels you use, and also drawings of same after they are worn out, if possible.
8. Do not confine yourself to the questions given above, but give your experience and opinions in full.

We trust the members will realize the necessity of furnishing full information on this important subject, that the Committee may submit reports to the next annual convention.

Replies to be sent before May 1, to F. G. Brownell, Master Mechanic, Burlington & Lamoille Railroad, Burlington, Vt.
F. G. BROWNELL,
J. M. FOSS,
A. G. EASTMAN, } Committee.

Transportation in Congress.

In the Senate on the 24th:

The following bills were reported favorably from committees and placed on the calendar:

By Mr. Morgan from the Committee on Public Lands—Granting a right of way over the public lands in Alabama and Florida to the Alabama Diagonal Railroad Co.
Also, granting similar right over public lands in Alabama to the Gulf & Chicago Railroad Co.

In the House on the 24th:

The following bills were introduced and referred:
By Mr. Seymour (Connecticut)—Authorizing the erection of bridges over navigable rivers under certain conditions.

By Mr. Morse (Massachusetts)—Providing for the transmission of correspondence by telegraph.

By Mr. Money (Mississippi)—To secure cheaper correspondence by telegraph.

The report of the Committee on Public Lands respecting the Northern Pacific forfeiture bill has been prepared by Representative Henley. It supports the bill for the reason that the land on the uncompleted portions of the railroad was forfeited on July 4, 1879, and should be so declared by act of Congress. The power of Congress to declare forfeited a grant of public land made to either a corporation or a state by an act containing a clause providing for reversion has been established, the report says, by repeated decisions of the Supreme Court. The claim of the company that they constitute an absolute dedication of the lands to the purpose of constructing the roads; that there is no condition subsequent whatever, and that the only power in the United States is the power through Congress to adopt such measures as may be necessary to insure the completion of the road in case the company does not build it, is held by the report to be untenable. The objection that the government cannot do what will prejudice the bondholders and stockholders rests upon the false assumption that Congress authorized a mortgage of the unconditional fee. On the contrary the mortgage received with his eyes open a defeasible estate, and so stands in the place of grantor so far as respects the question of forfeiture. The objection that the United States did not extinguish the Indian titles is answered by the statement that the government was not under obligation to do this.

Hoffmaster & Arthurs' Piston-Rod Lubricator.

We give an illustration of an improved form of gland for locomotive piston-rods and valve stems. It is the joint invention of Mr. Sol. Hoffmaster, the oldest passenger engineer on the Middle Division and perhaps on the Pennsylvania Railroad, and Mr. George W. Arthurs, foreman of the Pittsburgh Division round-house, and has been in use on the Pennsylvania Railroad for some time. The main feature of the patent is in enclosing the usual swab, and thus protecting it from dust and preventing the evaporation of the oil. The flange of the piston rod gland is cored out for a chamber containing waste or other suitable material for holding the lubricating substance surrounding the piston-rod. The chamber is provided with a cover to protect the waste from dirt and dust, which cover is held in place by a spring, or other suitable means, affording convenience in the ready removal of the cover for access to the chamber for refilling or removal of the waste, or resupplying the latter with oil. This operation of supplying oil is through the small opening in the cover. The cover and spring are preferably formed of a single piece. To obviate a waste of oil at each outward stroke of the piston-rod, a small brass shield containing a swab is secured to the front end of the gland. This shield surrounds the rod, and is held sufficiently tight against it, and against the end of the gland to catch any surplus oil, and also serves to protect the swab from dirt or dust. A perforation through the under side of the chamber permits the escape of condensed steam, and prevents it being blown out through the absorbing and lubricating filling.

The operation and advantages of the invention will be readily understood. Means are provided for keeping up the necessary supply of oil and also of preventing the waste of oil which occurs with other lubricators, and great compactness is secured by dispensing with the ordinary oil cup. The invention is patented in the United States and Canada.

National Association of General Passenger and Ticket Agents.

The semi-annual convention of this Association was held in Cincinnati, Tuesday, March 18. The convention was called to order at 11 a. m., President Tuttle in the chair.

A call of the roll developed the fact that a quorum was present.

The Executive Committee took favorable action on all credentials presented to them, and reported to that effect through their Chairman, Mr. Townsend.

The following is the list of members present. Those marked with a * have become members since last convention:

Allen, D. C., South Carolina.
Archer, John J., Scioto Valley.
Atmore, C. P., Louisville & Nashville.
Baldwin, Wm. S., Buffalo, New York & Philadelphia.
*Barney, P. W., Champlain T. Co.
*Benson, O. S., Brunswick & Western.
*Best, J. H., Keokuk & St. Louis Line.
Boothby, F. E., Maine Central.
*Boyd, S. F., Minneapolis & St. Louis.
Boyleston, S. C., Charleston & Savannah.
Bronson, H. M., Indiana, Bloomington & Western.
*Brown, F. E., Concord R. R.
Byington, E. B., Lehigh Valley.
Cark, J. S., Louisville, Evansville & St. Louis.
Carpenter, T. P., Lake Superior Transit Co.
Clark, A. E., New York, Pennsylvania & Ohio.
Chandler, F., Missouri Pacific.
Charlton, Jas., Chicago & Alton.
Cole, L. M., Baltimore & Ohio.
Cummings, S. W., Central Vermont.
Connor, Geo. L., Old Colony Steamboat Co.
Danley, W. L., Nashville, Chattanooga & St. Louis.
*Dodge, E. F., St. Paul & Duluth.
Egan, John, Cincinnati, Indianapolis, St. Louis & Chicago.
Emmerson, T. M., Atlantic Coast Line.
Emery, I. S., Rochester & Pittsburgh.
Flanders, D. J., Boston & Maine.
Fuller, H. W., Chesapeake & Ohio.
*Hibbard, F. B., Ulster & Delaware.
Hooper, S. K., Hannibal & St. Joseph.
*Horner, B. F., New York, Chicago & St. Louis.
Hanson, A. H., Illinois Central.
Harrison, W. H., Columbus, Hocking Valley & Toledo.
Hill, Wm., Chicago & Eastern Illinois.
Hall, Jas. M., Wheeling & Lake Erie.
Hynes, S. B., Southern Kansas Railway.
Kile, Chas. McD., Valley.
*Littlefield, James, Boston & Bangor S. S. Co.
Lockwood, C. L., Grand Rapids & Indiana.
Lowell, Percival, Chicago, Burlington & Quincy.
Macmurdo, John R., Richmond & Alleghany.
McCollister, A., Cincinnati, Selma & Mobile.
Moran, M. R., New London Northern.
Morse, J. W., Union Pacific.

Morse, F. W., Montpelier & Wells River.
Orme, A. J., Atlanta & West Point.
Pope, A., Shenandoah Valley.
Pope, A., Norfolk & Western.
Pope, A., East Tennessee, Virginia & Georgia.
Ray, E. A., New Haven & Northampton.
Sanderson, Geo. A., Toledo, Cincinnati & St. Louis.
Shattuc, W. B., Ohio & Mississippi.
Shepherd, F. C., Pensacola & Atlantic.
Smith, A. D., Pittsburgh & Lake Erie.
Stebbins, C. S., Union Pacific.
Smith, A. J. C., C. & I. and I. & St. L. (Bee Line).
Smith, Geo. W., Lake Erie & Western.
Stevenson, Samuel, Cincinnati, Hamilton & Dayton.
Taylor, C. A., Richmond, Fredericksburg & Potomac.
Tarall, W. A., Chicago & Northwestern.
Townsend, H. C., Missouri Pacific.
Tuttle, L., Eastern (Mass.).
Van Benthuyzen, C. R., Hudson River Line Steamers.
* Walters, M. B., Peoples' Line Steamers.
* Waller, Chas. J., Mobile & Ohio.
* Warren, C. H., St. Paul, Minn. & Manitoba.
* Waldron, E. A., International S. S. Co.
Wilson, E. P., Cincinnati Southern.
Wishart, D., St. Louis & San Francisco.
Wrenn, B. W., Western & Atlantic.
Zimmerman, D. M., Camden & Atlantic.

Honorary Members Present.

Pierson, S. F., New York.
King, W. H., Cincinnati.
Pillsbury, J. W., Cincinnati.
Penfield, T., Chicago.
Fitch, Chas. L., New Orleans.
Keller, Murray, Louisville.
Burch, J. A., Buffalo.

Total number of members, 153; number present, 63.
Special credentials for this meeting were presented as follows:

By A. F. Merrill, representing the Chicago, Milwaukee & St. Paul; by O. H. Briggs, representing the Providence & Worcester; by E. O. McCormick, representing the Louisville, New Albany & Chicago; by C. W. Adams, representing the Pennsylvania Company; by J. E. Hannigan, representing the Burlington, Cedar Rapids & Northern; by J. M. Chesbrough, representing the Vandalia Line; and by Thomas McGill, representing the Central of Georgia. The Pennsylvania Railroad was represented by George Boyd, Assistant General Passenger Agent.

The next order of business was the making of passenger rates, which on motion properly seconded and carried was dispensed with. The selection of the next place of meeting was next in order. The following points were nominated: Boston, Mass., and Lake Minnetonka, Minn. Boston was selected.

Unfinished business was next in order. The Rate Bureau Committee of 15 appointed at the last meeting reported through their Chairman, Mr. Atmore, that sufficient progress had not been made to enable them to present a proper report, and on motion were given further time. There being no further unfinished business the Chair announced that the convention would proceed to the consideration of such miscellaneous business as might be on the table. The following gentlemen were nominated as honorary members: R. T. Brydon, T. Penfield, C. L. Fitch, Murray Keller, A. B. Leet and J. A. Burch. The Chair announced that if there were no objections the Secretary would place the above mentioned names on the list of honorary members, and as none were offered it was so ordered.

The Secretary announced that he had a communication from Mr. Chas. L. Fitch, Chief of Transportation for "The World's Industrial and Cotton Centennial Exposition," to be held in New Orleans, La., commencing the first Monday in December, 1884. As Mr. Fitch was in attendance, on motion which was unanimously adopted, he was invited to present the matter. The Chair here announced that if there were any gentlemen present who were not under the rules entitled to seats in the convention they would please retire.

Mr. Wilson, who had been appointed to wait upon Mr. Fitch, reported him in person. He presented the claims and wishes of the exposition in a concise, complete and careful manner, after which the following was offered by Mr. Wilson, seconded by Mr. Atmore:

"Resolved, That the President be authorized to appoint a committee of 15 with power to act, properly representing the territory from which travel to the World's Exposition at New Orleans may be drawn. Said committee be instructed to meet promptly and prepare basis rules and rates to govern transportation of passengers to New Orleans, and to transmit its conclusions to the Secretary of this association, who is hereby instructed to promulgate the same as the official action of this association."

An extended discussion of the resolution followed, participated in by Messrs. George Boyd, Charlton, Stebbins, Atmore, Wilson and Smith, after which it was adopted.

The Chair appointed the committee, as follows: Messrs. Wilson, Atmore, Hanson, Chandler, Waller, Pope, Pierce, Wood, Slaughter, Wrenn, Whitehead, A. J. Smith, Ford, Shattuc, Emmerson.

The Secretary read a communication from the Secretary of the National Association of General Baggage Agents; no action was taken.

A communication was presented from W. D. Parker, Superintendent of Transportation National Educational Association, to be held at Madison, Wis., July, 1884. An informal discussion, participated in by Messrs. Thrall, Atmore, Boyd and Boylston, followed, after which, on motion seconded and carried, the matter was referred to the district associations for such action as they might desire.

The Secretary presented petitions from the wholesale dry goods and notion merchants, the wholesale boot and shoe houses and from the wholesale clothiers of Cincinnati, requesting certain concessions in the way of rates on baggage and mileage tickets. The Chair reminded the Association that they had a General Committee whose duty it was to examine matters of this kind and recommend action to the convention, and suggested that these be referred to that committee. An informal discussion followed, participated in by Messrs. Boylston, Shattuc, Pope and Boyd. A motion was made and seconded that a special committee of five be appointed to wait on the merchants, which was laid on the table, after which the whole matter was by motion duly seconded laid on the table.

Applications for special rates for the National Baptist Anniversaries, also for special rates for the International Sunday School Convention were by regular methods referred to the local associations.

On motion adjourned until 10 a. m., March 19.

SECOND DAY.

Wednesday, March 19, the convention was called to order at 10 a. m., President Tuttle in the chair. The consideration of miscellaneous business was resumed.

The Secretary announced that he had been interviewed by one of the committee of Cincinnati merchants, who feared that the convention in considering their petition during the session of the 18th, had regarded the question as a local

one and desired that the Association should be made aware of the fact that they had other petitions from the merchants of Baltimore, Philadelphia, New York and Rochester, and wished them to consider their action. On motion duly seconded and carried the question was taken from the table for further consideration. As the petitioners requested changes in present rules as to excess baggage and mileage tickets, on motion which was adopted the question was divided.

The following was then offered and seconded:

"Resolved, That on and after April 1 next, 250 pounds of baggage shall be allowed all commercial travelers, traveling over roads numbers of this Association."

Remarks by Messrs. Shattuc, Wilson, Boylston, Emmerson, Thrall, Boyd, Pope, Charlton and Taylor followed, after which a motion was made, seconded and adopted, that the whole matter be laid on the table.

Communications to the Western Association, which had by it been referred to this Association, were presented: but as they were similar in character to those that had already been disposed of, they were referred to local associations for action. (One from R. W. Stevenson for special rates to the National Teachers' Association, to be held at Madison, Wis., July, 1884, and one from H. Z. Leonard, asking for special rates to the National Convention of the National Party, to be held at Indianapolis, May, 1884.)

Mr. Emery asked the opinion of the Association as to the rights to report coupon tickets to lines over which they do not read. The rule adopted at the meeting in New York, in September, 1879, was read, which is still in force, and which is as follows:

"Tickets shall be reported as sold, to the roads over which they read, and they shall not be reported to roads over which they do not read, even if they are honored over such roads, except by the consent of the road or roads over which such tickets read."

At this point the Chair allowed an informal discussion of the question of "Skeleton Tickets." It took a wide range and was interesting and spirited, and was participated in by Messrs. Atmore, Shattuc, Charlton, Pope, G. W. Smith, Boylston and Stebbins.

The Chair announced, that as there was no further miscellaneous business, we would proceed to the next order, which was the election of officers.

Mr. Shattuc nominated, for re-election, the present President, Mr. Lucius Tuttle, of Boston, Mass. There being no

would not have been time to avert the second collision which occurred. The mail train had reached the distant signal, but the thick weather prevented the engineer of the mail seeing what had occurred. As soon as he did see the wrecked train he applied his brake, but it was too late; the engine struck one of the wagons and them came upon some of the logs of wood. In this way the engine was nearly overturned, and the permanent way torn up and destroyed. The scene was now one of great confusion; cars, engines and debris blocked both rails and covered the banks. In some miraculous way the officials in charge of the trains escaped almost without injury, as did also the post-office officials, but some were shaken.

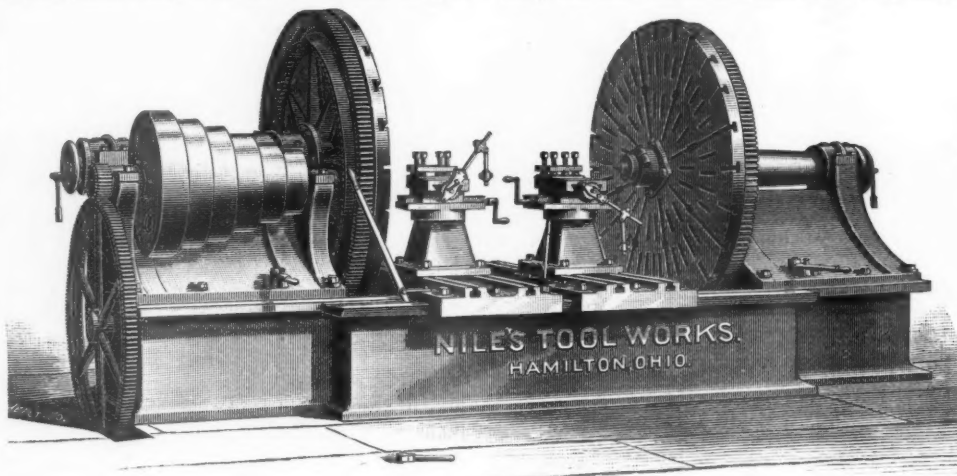
Double-Head Driving-Wheel Lathe.

We illustrate herewith a new double-head driving-wheel lathe built by the Niles Tool Works, of Hamilton, Ohio. This lathe is designed with special reference to power and strength, to adapt it to the heavy work for which it is intended. The cut represents a lathe of 84-in. swing, capable of turning drivers 6 ft. 6 in. diameter on the tread. It is shown without quartering and crank pin boring attachment, which when in place is located on the back-head, the spindle extending through the face-plate and drilling from the outside of the wheel inwards. In order to get the greatest strength and stiffness at the point where the greatest strain is imposed, the front web of the bed is elevated, so that very short and stiff tool posts may be used. The back web of the bed, which is not subjected to such great strains, is made low, so as to facilitate the handling of wheels in and out of the machine.

The driving cone has six steps for a belt 6 in. wide.

One face-plate has internal and external gears, so that it may be driven at 12 different speeds; the right-hand face-plate has external gear only, thus giving it six different speeds. The face-plates may be driven together or separately, as desired, or at the same or different speeds.

Every gear about the machine, including the large internal



DOUBLE-HEAD DRIVING-WHEEL LATHE.

other nomination, the Secretary, on motion, was instructed to cast the vote of the Association for Mr. Tuttle. Mr. Shattuc presented the name of Mr. Taylor, of Richmond, Va., the present Vice-President, for re-election to that office, and as there were no other nominations, and on motion duly seconded, the vote of the Association was cast in the same manner as for the President.

Mr. A. J. Smith's name being the only one presented for the office of the Secretary, the President was directed to cast the vote of the Association for him, which was done.

The Chair announced the following nominations for members of the Executive Committee: Geo. L. Conner, New York; James Charlton, Chicago; Samuel Stevenson, Cincinnati.

For the General Committee: D. J. Flanders, Boston; F. C. Norris, Denver; C. R. Van Benthuyzen, New York, and in place of Mr. H. R. Dering, who is no longer a member of the Association, Mr. D. M. Kendrick, of Albany.

As there were no objections, the above nominations stood confirmed.

The Chair allowed the following to be offered, out of order.

"Resolved, That the Chair appoint a committee of five to formulate resolutions expressing in same the benefits derived from the adoption of standard time, and of our appreciation of the labors of Mr. W. F. Allen, editor of the *Official Guide*, in having this much desired arrangement perfected, to report to the Secretary after adjournment."

Adopted unanimously.

The Chair appointed as such committee Messrs. Atmore, Pope, Boyd, Shattuc and Charlton.

The following was offered and adopted unanimously:

"Resolved, That the Secretary of this Association be instructed to tender a vote of thanks to the proprietors of the Burnett House, for courtesies extended by furnishing a room for this meeting, and for other facilities rendered for the transaction of business. And that thanks be extended to the several theatrical managers of Cincinnati for the courtesies received from them."

On motion, the Convention adjourned *sine die*.

A Triple Collision.

The *Engineer* says that on Sunday morning, March 2, a series of railway collisions occurred on the Caledonian Railway. A freight train from Perth to Aberdeen had got as far as Kirriemuir Junction, about three miles from Forfar, when it was shunted from the down to the up line to let the mail train pass. Shortly afterward another freight train from Forfar came up and collided with the Perth train, the result being that nine cars were smashed and both lines were blocked. Some very large logs of wood which were thrown from the cars fell upon the signal wires, so that the officials were unable to raise the signal against the mail train, which had before the collision occurred passed Glamis, the station to the south of the junction. It seems, however, that even had the signals been workable there

and external gears on the face-plates, is accurately cut from the solid. These large face-plate gears are not cut or cast directly on to the face-plate, but are separate rings bolted fast to it by a heavy flange. They are equally as strong as if cast with the face-plate, and at the same time, should any accident occur causing the breakage of a number of teeth the gear can be readily replaced.

The main driving shaft, which transmits the power from one face-plate to the other, is a heavy steel forging of extra large diameter, so as to reduce to a minimum the torsion, which is a fruitful cause of chatter to the machine. In this lathe this shaft is 5½ in. diameter.

The main spindles to which the face-plates are attached have very large and long bearings. Each main spindle has an internal sliding spindle, with sufficient traverse, so that wheels may be turned on their axles with both crank pins in place. The compound rests have automatic feeds in all directions, operated by over-head rock shaft, driven by feed disks on the ends of the spindles.

Marking Cars of Fast Freight Lines.

The following report on marking cars of fast freight lines was presented to the Master Car-Builders' Association at its last annual convention in Chicago:

Your Committee which was appointed yesterday and instructed to confer with the delegates from the Car Accountants' Association of the United States and Canada in reference to a better system of marking the cars of fast freight lines, beg leave to report as follows:

The Car Accountants' Association of the United States and Canada at their recent Philadelphia meeting, resolved to make an effort to induce the managers of railroads and of fast freight lines to adopt some such uniform system of marking the cars of fast freight lines as would result in an abatement of the trouble which now exists in reporting and recording the movement of those cars. The Car Accountants' Association therefore appointed a committee (comprising Mr. Maroney of the Baltimore & Ohio, Mr. Squires of the Chicago, Burlington & Quincy, and Mr. Davis of the Michigan Central Railroad), and instructed that Committee to ask the privilege of appearing before the Master Car-Builders' Association at their Chicago meeting. That Committee, through its Chairman, Mr. Maroney, presented the subject before the special session of this Convention yesterday afternoon.

Your Committee now reporting have conferred further

on the depot switch near the west end, the runaways crashed into them, snapped off the 16-in. solid oak butting post, drove them through the heavy doors at the west end of the depot, and pitched them in a heap clean across Delaware street.

The biggest thing about it was that from so great a danger so little loss resulted. The Union tracks are clear at 1 o'clock in the morning; no trains and no people, except the night trains, are on the tracks. Jim Brown, night Pan Handle yard man, was making up the eastern freight train. Switch engine No. 303, Charles Kline, engineer, Dunham, fireman, had hauled the 16 cars from the depot (leaving the switch turned as usual) to the outer yards. There, on a side track, some cars were off the track. The crew of 303 left their train on the main track on the brow of the hill, Brown and Healey, as they claim, first setting two brakes to hold the train. The intention was to assist in putting the cars which were off the track back on again, then to continue the trip to the Belt. No. 303 had scarcely left the cars when they began to waver and finally started slowly toward the city. Brown did not see that they were in motion, or thought they could easily be overtaken. Soon, however, a roaring sound reached his ears and he realized that his train was nearly half a mile away, dashing down the Union track straight for the depot. No. 303 started in pursuit at the top of her "pony" speed. Near Noble street the cars were overtaken, but their speed was so great that the engine could not couple to them. A halt was made by the engine, and breathlessly the crash was awaited. It soon came. At the train dispatcher's office, near New Jersey street, several switchmen tried to board the train and put on brakes, but it dashed by them like a lightning express. They say it was making at least 25 miles an hour. The speed must have been prodigious. Not only was a section of the brick wall of the depot carried away, but Delaware street was plowed like prairie ground, the bowlders and bricks of the pavements uprooted and the curb-stones ground to powder. Evans' oil mill had a narrow escape. The cars, as they shot through the end of the depot, were aimed directly at the brick walls of the mill, but the second carstone turned the course of the first car, and, after mounting the sidewalk, it turned northward and tumbled over into the vacant lot adjoining the mill. The trucks of the three cars were all torn off and scattered about the street, and the cars were badly damaged. The loss will not exceed, probably, \$1,000.—*Indianapolis News*, March 22.

Caring for Employees.

The Eastern Railroad Co. has placed a large room in its passenger station at Salem, Mass., at the disposal of its employees, to be used as a reading-room and a place for meetings.

Damages for a Voice.

A singular suit for damages was recently concluded in Charlotte, N. C. Mr. J. M. Turrentine was some years ago a mail agent on the route between Charlotte and Danville. He claimed that during the cold weather the company failed to provide a stove in his car, from which he took cold and suffered so severely that he lost his voice. Mr. Turrentine appraised his voice at \$20,000, and brought suit against the Richmond & Danville Co. for that amount. The suit was finally concluded by a verdict against the company for \$2,500.

A Car in a Tree.

Lost car agents find cars in all sorts of curious places, but Mr. Rogers, of the Pennsylvania road, recently had an experience which was out of the way even for him. In search recently of two missing coal cars out in the flooded district in Ohio, he found one of them in a corn-field, which was not so uncommon, but soon after he found the other on the top of a tree.

Forgetting the Baby.

Railroad conductors are continually receiving telegrams asking for articles left by forgetful passengers on the trains. Canes, umbrellas and articles of clothing are most often inquired after, but recently Conductor Campbell was surprised by a most unusual request. He was running a train down the Auburn road, and among the passengers who boarded at a station not many miles from this city were a young man and wife, accompanied by a little boy scarcely able to walk. They alighted at Phelps. When the train reached Geneva Conductor Campbell was surprised to receive a telegram stating that the little boy had fallen asleep and had been forgotten by the parents in the hurry of getting off the train. He was desired to find the child and send it back on the first train, and accordingly went through his train, but could get no trace of the little one. He has never heard anything more of the matter and believes that the little fellow got off at Phelps unseen by his parents.—*Rochester (N. Y.) Union*.

The School of Trainmen.

"Suppose a passenger having a ticket dies on my train, would it be proper to lift it?"
"What—the train?"
"No; the ticket."
"A full first-class ticket is required for a corpse," is the answer.

"Yes; but then it travels in the baggage car. The circumstances in the case I state are unusual. What must I do?"
"You have no authority to touch anything on the body. The coroner is the proper person to take up the ticket and deliver it to the company," explained the instructor clearly.

Fifteen men sat at desks in a rear wing of the vast building of the Pennsylvania railroad on Fourth street every day last week undergoing the usual inquisition which determines their capabilities. The above and many similar dialogues occurred during the week's examination and so far from appearing humorous or ridiculous to the preceptors, such inquiries were encouraged.

"Almost anything is liable to happen on a train," explained one of the tutors to a *Times* reporter on Saturday. "A thorough knowledge of the rights of the company and the passenger is essential. In the case you overheard the responsibilities of the company undergo a complete change by the sudden death of a passenger from natural causes. You can see that a conductor may be called on, in an emergency, to decide some very important and knotty questions."

Beginning this morning, 15 more applicants, coming chiefly from the ranks of brakemen and gatemen, will be examined for prospective conductorships. Six applications are already filed for next week. The method pursued in the week's examination is varied somewhat, from time to time, but takes this general shape: The candidate is first asked to write a letter. Then he is tested as to his knowledge of mathematics. A statement more or less intricate, and involving numerous whole and half-fare tickets and rebate coupons, is read to him. He is told to render an account. The time consumed in making up his statement is noted to a fraction of a minute. At other times a statement is required of the miles traveled by passengers on a mythical train that makes lightning trips to all parts of the main and leased lines. The candidate is then lectured for two days, generally Tuesday

and Wednesday. All the kinds of tickets are described. The rights of passengers and of the corporation are defined; local, first-class, thousand-mile, commutation, school, limited excursion, workmen's and stock-shippers' tickets are carefully described. Samples of the various tickets are shown the candidates, and some of the interpretations put on the language of the ticket by the nascent conductors are novel, interesting and often startling. Not much time is wasted over free passes, for the company incurs no responsibility for a passenger traveling on tickets of that kind. About this point a budding conductor asked several days ago: "Suppose a man goes to Pittsburgh on a return pass and dies there, will his pass be good to bring the body back?" The answer was in the negative, though circumstances might secure a waiver of the company's rights.

By Thursday the applicant is expected to know every station on the main line, the points at which branch roads defect, the crossings where connections are to be made and the names of all the leased roads in New Jersey and Pennsylvania. The rest of the week is devoted to questioning and drilling him in the details of his daily work.

Finally, on Saturday a tabulated statement is made of the candidate's grade. The successful men are rated first, second or third class. All ranking below the latter grade are dropped. Men of the first or second classes are appointed to main-line trains; those of the third-class are only placed in charge of trains on branch lines. When the applicant has been unfortunate in his early education and is naturally intelligent he is urged to try again and is allowed a year or more to prepare for his re-examination.—*Philadelphia Times*.

The Santa Fe's Corn Train.

A train consisting of 35 Atchison, Topeka & Santa Fe cars loaded with corn donated to the flood sufferers of the Ohio valley by the farmers and merchants of Sedgwick County, Kan., will arrive in St. Louis next Thursday morning. It leaves Wichita on Monday morning via the Atchison, Topeka & Santa Fe, and at Kansas City will be turned over to the Chicago & Alton and be delivered at St. Louis to the Ohio & Mississippi, and by the latter hauled to Cincinnati, which will be the distributing point.

The Santa Fe, besides furnishing cars and transportation free, has decorated the train gorgeously, but tastefully, and it will enter St. Louis with flying colors and bearing mottoes, proclaiming the sentiments of the farmers of Kansas. The train will remain in St. Louis all day Thursday that every one may have an opportunity to see the rare and novel sight.—*St. Louis Republican*, March 16.

A Train Stopped by a Dog.

A very singular occurrence, and one which gave the trainmen no small amount of annoyance, occurred at Binghamton Thursday afternoon. When Erie train No. 8 was ready to proceed East the engineer found that he could not start the train, and an investigation to discover the why and the wherefore was begun. He first examined the locomotive thoroughly, but discovered nothing wrong, and again attempted to start, but the train would not move. Another examination was begun, which included the entire train, and the difficulty was discovered. It was found that the air-brakes on one of the day coaches were set, and on inquiry it was ascertained that while the train was standing at the station two dogs passed under the coach, and in playing, struck against the trial stop-cock attached to the air-brake cylinder, which extends downward. This stop-cock was broken off, and as a result the air-brakes were set. When the train arrived it was 40 minutes late, and nearly that much more time was lost before the train was got under headway again.—*Port Jervis Gazette*, March 15.

TECHNICAL.

Locomotive Building.

The Brooks Locomotive Works in Dunkirk, N. Y., have recently delivered two Mogul freight engines to the Michigan & Ohio road.

The Western & Atlantic shops in Atlanta, Ga., are building two passenger engines to run the fast express trains over the road, which are now too heavy for the engines heretofore used. The new locomotives have 17 by 24 in. cylinders and 63 in. driving wheels.

The Baldwin Locomotive Works in Philadelphia recently shipped a Mogul locomotive to the Cahaba Coal Co. in Alabama.

The Baldwin Locomotive Works in Philadelphia are completing an order for 10 mogul freight engines for the Alabama Great Southern road.

The Rhode Island Locomotive Works in Providence are completing an order for freight locomotives for the Texas & St. Louis road.

Car Notes.

The Gill Car Manufacturing Co. in Columbus, O., made an assignment March 20. The schedule shows nominal assets to the amount of \$490,000 and liabilities of 259,000. The assets consist of the car-works plant, \$250,000; bills receivable, \$190,000; accounts receivable, \$10,000; material on hand, \$40,000. The liabilities are as follows: Mortgage in favor of G. G. Green, of New Jersey, \$25,000 on car-works and 1,500 acres of coal land in Athens County; mortgage on same to secure \$250,000 first mortgage bonds, only \$82,000 of which have been negotiated; bills payable, \$67,000; bank loans, \$68,000; open accounts, \$19,000. It is thought from the character of the assets that the shrinkage and expense of closing up the business will reduce the amount nearly to a level with the liabilities. The causes of the company's embarrassment date back to 1873.

The Chicago, Burlington & Quincy shops in Aurora, Ill., have begun to build six new postal cars for the road.

Mr. E. Nott Schermerhorn has been appointed Receiver of the Jones Car Manufacturing Co. of Schenectady, N. Y., by the Supreme Court. Work on contracts will be continued in the shops of the company.

The Wason Manufacturing Co. in Brightwood (Springfield), Mass., has just completed eight passenger cars to go to Chili. There are in the shops a parlor car for the Old Colony road; six passenger cars for the Maine Central; six for the Boston & Providence; one for the Providence, Warren & Bristol, and 10 open excursion cars for the New York & Brighton Beach road. The shops have also 99 freight cars ready to ship to Chili.

The Diamond State Car Spring Co., of Wilmington, Del., has made important additions to its works, having put in several thousand dollars' worth of new machinery, and now announces that it is prepared to manufacture the same spring as made by the A. B. Davis Car Spring Co. and the A. & W. Middleton Co. The company has recently received several orders, including one for springs for 1,000 cars.

Bridge Notes.

The Central Bridge Works in Buffalo, N. Y., have contracts on hand for three iron bridges for the New York, Lake Erie & Western and one for the Northern Pacific road.

The contract for an iron highway bridge over the Blue Earth River at Good Thunder's Ford, Minn., has been let to P. E. Lane, of Chicago.

The Penn Bridge Works in Beaver Falls, Pa., recently

completed at Shuqulac, Miss., an iron draw-bridge of 120 ft. span.

Fleming & Son, in St. John, N. B., have taken a contract for the iron trestle work along the wharves in that city, connecting with the new bridge over the St. John River.

The Keystone Bridge Co. in Pittsburgh has the contract for the Louisville & Nashville's new bridge over the Ohio River at Henderson, Ky. The bridge will have five spans of 190 ft. each, eight spans of 250 ft. each and a channel span 525 ft. long, making a total of 3,125 ft. There will also be a long iron trestle in one of the approaches. The bridge is to be completed by Jan. 1 next.

Iron Notes.

At the mines of the Hudson River Ore & Iron Co. at Burden, N. Y., Superintendent Coyle is sinking the main slope at the rate of 7 ft. each shift. He uses the "Sluggo" rock drill and "Rackarock" blasting powder entirely.

The Bethlehem Iron Co. at Bethlehem, Pa., is filling a contract for heavy steel rails for the Lehigh Valley road. These rails weigh 76 lbs. to the yard.

The stockholders of the Eureka Iron Co. at Oxmoor, Ala., have authorized the issue of \$400,000 bonds, to be secured by a mortgage on the property.

Falling Spring Furnace at Chambersburg, Pa., has recently gone into blast. It is a charcoal furnace 40 ft. high and 8 ft. bosh, and is making 17 tons of iron a day.

The Chestnut Hill Iron Ore Co. will shortly put one of its furnaces at Columbia, Pa., into blast, but the other two will remain idle.

Merion and Elizabeth furnaces at West Conshohocken, Pa., will soon go into blast. They are owned by J. B. Moorhead & Co., of Philadelphia.

An order has been issued by Judge Blodgett, of Chicago, in the case of Stone against the Union Iron & Steel Co., which substantially takes the company out of court. The order directed the Receiver, A. L. Griffin, to reconvey to the company all the property belonging to it held by him. The company immediately conveyed all its assets to Henry H. Porter, in pursuance of his settlement made in his circular of July 14. The total debt of the old company was \$3,000,000, which has been canceled. The new company is to be called the Union Steel Co., and it will receive the \$460,000 from the sale of the 100,000 tons of the iron ore belonging to the old company and sold to the Joliet Steel Co.

Etna Furnace in West New Castle, Pa., is now completed and has gone into blast. It is 75 ft. high and 16 ft. bosh, and is expected to make 100 tons of iron a day.

The New York & Philadelphia Coal & Iron Co. has filed articles of incorporation in Pennsylvania, with \$5,000,000 capital stock. It will carry on business in Somerset and Cambria counties.

Manufacturing Notes.

The Catsaqua Manufacturing Co. in Catsaqua, Pa., are making the angles and iron plates for the Philadelphia Cable Railway Co.'s cable street railroad.

The Automatic Truck Works of John Terhune at Midland Park, N. J., have recently shipped improved automatic trucks to the Lehigh Valley road, the Manchester Locomotive Works, the Schenectady Locomotive Works and others. Mr. Terhune has recently received inquiries from England and Brazil.

The Iron Telegraph Pole & Post Co., of New York, makes telegraph posts and poles of sheet iron and steel.

The Pacific Iron Works in Bridgeport, Conn., are building two very large hoisting engines and a number of large stationary engines for various parties.

Lowe & Watson, in Bridgeport, Conn., have recently furnished the Naugatuck Railroad repair shops with a 50-horse power Lowe patent boiler. The furnace is supplied with patent air gates.

The Rail Market.

Steel Rails.—The market is more active and sales of 40,000 tons are reported, including one order of 15,000 tons from the South and one of 10,000 tons from the Northwest. The *Iron Age* says: "All the sales referred to were made by eastern companies. The outlook is good for further business, though it may be some time before the principal buyers now making inquiries shall place their orders. Competition for business is very sharp, notwithstanding the large amount of work under contract for the greater part of this year. Prices are nominally \$34 at eastern mills, and this rate is being maintained, it is asserted, for small orders, but bids for lots of 2,000 tons and upward have been made at lower rates. Some English 60-lbs. steel rails, amounting to 2,500 tons in all, Sandberg section, in store at Boston, are offered at \$31 f. o. b. Boston."

Rail Fastenings.—Quotations are steady at \$2.50 per 100 lbs. for spikes in Pittsburgh, \$2.75 to \$3 for track bolts and 1.75 to 1.85 cents per pound for splice bars.

Old Rails.—The demand is more active, but prices are very irregular and old iron rails are quoted at \$21.50 to \$23 per ton at tidewater, without large sales.

Gas Light on Cars.

The Pintsch Lighting Co. has contracted to erect gas-works at Hoboken, N. J., for furnishing their compressed gas for lighting the ferry-boats of the Delaware, Lackawanna & Western road. The English company, which introduces this system, has recently contracted for lighting 434 cars on the Midland, the Metropolitan, the Glasgow & Southwestern, the Caledonian, the North British, the London & Southwestern and the Metropolitan District railways. The orders for the last two railways were obtained after experiment and trial in competition with the electric lighting systems. There were on Jan. 19 last 15,088 cars and 491 locomotives in the world lighted by the Pintsch system.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

	Page.		Page.
Atchison, Top. & Santa Fe.....	64	N. Y. Susquehanna & West.....	117
Camden & Atlantic.....	193	Northern Central.....	165
Charlotte, Col. & Augusta.....	232	Pennsylvania & New York.....	149
Chicago & Alton.....	146	Pennsylvania Railroad.....	181
Chl., Milwaukee & St. Paul.....	87	Perkiomen.....	87
Cin., New Orleans & Tex. Pa.....	164	Petersburg.....	27
Cin., Wash. & Baltimore.....	46	Philadelphia & Reading.....	27
Cleveland & Pittsburgh.....	46	Philadelphia, W. & Balt.....	106
Columbia & Greenville.....	87	Pittsburgh & Castle Shannon.....	164
Columbus, Hocking V. & Tol.....	202	Pittsburgh & Lake Erie.....	47
Connecticut River.....	64	Pittsburgh, McK. & Yough.....	63
Delaware & Hudson Canal Co.....	149	Portland & Ogdensburg.....	37
Delaware, Lacka. & Western.....	165	Portland & Rochester.....	107
Fitchburg.....	47	Providence & Worcester.....	64
Hartford & Conn. Western.....	165	Richmond & Danville.....	23
Houston & Texas.....	193	St. Louis, Vandalia & T. H.....	106
Huntingdon & Broad Top Mt.....	107	St. Paul & Duluth.....	87
Illinois Central.....	164	Sandy River.....	87
Knox & Lincoln.....	105	South Carolina.....	105
Lehigh Coal and Navigation Co.....	117	Texas & Pacific.....	193
Lehigh Valley.....	47	Troy & Greenfield.....	46
Mississippi & Tennessee.....	8	Union Pacific.....	166
Missouri Pacific.....	20	Utica & Black River.....	87
New Haven & Northampton.....	147	Western Maryland.....	8
N. Y. Lake Erie & Western.....	231	West Jersey.....	87
N. Y. N. Haven & Hartford.....	27	West Va. Central & Pittsburgh.....	46
N. Y. Ontario & Western.....	106	Wilmington, Col. & Augusta.....	46
N. Y., Pennsylvania & Ohio.....	139	Wilmington & Weldon.....	9



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE CHICAGO, MILWAUKEE & ST. PAUL REPORT.

The Chicago, Milwaukee & St. Paul Railway continued to grow last year, though not so much as in some previous years since it began to grow in 1878, having for several years previously stood still with 1,400 miles of road.

The mileage at the close of each year since 1877 has been:

1878.	1879.	1880.	1881.	1882.	1883.
1,696	2,231	3,775	4,260	4,520	4,760

Since 1877 there has been an increase of 3,360 miles, or 240 per cent. Thus the road is a very different thing from what it used to be. The additions last year were 240 miles, or 5.3 per cent., 146 of which were in Dakota, in which new territory this company has now no less than 794 miles of railroad.

The average mileage worked increased from 4,296 in 1882 to 4,549 last year, or 6 per cent. But the freight traffic increased from 945 to 1,176 millions of ton-miles (24 per cent.), and the passenger traffic from 201 to 236 millions of passenger miles, or 17½ per cent.; and this increase of traffic, equivalent in all to 22 per cent., was carried with an increase of 18 per cent. in train mileage. There was a larger traffic per mile and a larger average train load, both of which are favorable for increasing profits. A slight decrease in rates caused the 22 per cent. increase in traffic to add but 16 per cent. in the earnings, but as the expenses increased but 13 per cent., there was a gain of 20½ per cent. in net earnings, though the mileage worked increased but 6 per cent.

This company is distinguished for its very light capital account. The immense additions to its system, making more than two-thirds of its mileage, acquired within the past few years, have been paid for chiefly by new issues of bonds, and have not been costly. For the most part they were built over an undeveloped prairie country, affording but a thin traffic, which is adequately served by a cheap structure, on which considerable expenditures will have to be made hereafter when the traffic grows, if it is to be conducted at all economically. To this, however, there are some exceptions. Not a little of the road which the company has bought since 1878 was in a very well developed country, though the roads generally had a light traffic; and about four-fifths of the line from Chicago to Council Bluffs has been acquired, and most of it built, since that time, and this line doubtless has much more than the average traffic of the system, and has cost much more than the other new road of the company, which is mostly in northwestern Iowa (very thinly peopled down to 1880 at least) and in Dakota, where, as we have said, the company now has 794 miles of railroad completed, nearly all of it built in advance of the population and production which must support it, but in a country which will doubtless at no distant day afford a traffic something like that of the country further east in Minnesota and Iowa.

Considering that so large a portion of the company's road is in new country, where as yet the traffic could do little more than pay the light working expenses, and

considering also the course of traffic and earnings on other railroads west of Lake Michigan last year, it is remarkable that the Chicago, Milwaukee and St. Paul should have made so large a gain in gross and net earnings last year. Probably it would have made little or none but for the opening of its Chicago-Council Bluffs line, which not only is through a prosperous and well-peopled district which affords a large local traffic (which is for the most part diverted from the parallel Northwestern and Rock Island lines), but had from the first one-fourth of the Union Pacific through freight traffic. Moreover, 1883 was the fifth year of the great growth of this road, and it is probable that some of the lines had then so developed as to increase considerably their net earnings.

The report for 1882 showed a very large floating debt. The current liabilities then amounted to \$7,160,502, besides \$2,592,137 of interest on bonds payable the next day, against \$5,088,570 of cash, bills and accounts receivable, \$1,787,509 of bills receivable for the sale of the land grant, which was represented in the capital, and, \$1,495,113 in the stock of materials on hand. An issue of \$3,000,000 stock at par last June enabled the company to reduce the excessive floating debt, and the balance sheet for the close of 1883 shows a much amended condition of things, the current liabilities amounting to \$3,443,787, the interest payable Jan. 1 to \$2,778,307, while the cash, bills and accounts receivable were \$4,599,197, and the stock of materials on hand (which, however, is as indispensable as the rolling stock itself) was \$1,223,043. The accounts payable largely represent the working stock of supplies, which may permit counting them as an asset against current liabilities. Perhaps also the item of \$1,161,980, given in the assets this year for the first time as representing "St. Paul & Duluth stock and other investments," was acquired by bills payable, but if the company means to keep these investments they should be represented by the fixed capital. Including this and the stock of materials on hand we have, at the end of 1883, \$6,994,220 of assets to set against \$6,222,004 of current liabilities, including the interest due Jan. 1.

The different items in these accounts at the end of December in 1883 and 1882 were:

	1883.	1882.
Assets:		
St. P. & D. stock and other investments.....	\$1,161,980.09	.....
Balances due from agents and cos.....	377,769.03	\$226,086.62
Materials on hand.....	1,223,043.17	1,495,112.82
Bills receivable.....	1,172,463.22	1,600.00
for sales of land.....	.....	1,787,508.90
Cash on hand.....	3,048,964.89	2,969,732.42
Total.....	\$6,984,220.40	\$6,826,078.58
Current liabilities:		
Incumbrances assumed.....	.....	6,755.00
Bills payable.....	1,540,124.81	2,712,038.48
Vouchers and pay rolls.....	1,732,687.29	2,216,629.84
Current balances, miscel. accts.....	77,488.53	2,141,916.27
Dividends and interest unclaimed.....	93,487.65	83,162.89
Total.....	\$3,443,787.28	\$7,160,502.48
Coupons due Jan. 1.....	2,778,307.50	2,592,137.50
Total.....	\$6,222,094.78	\$9,752,639.98

This statement shows an increase of \$158,000 in the assets at the same time with a decrease of \$2,926,500 in the liabilities, which is a reduction of the excess of liabilities by \$3,084,000, against which we have the increase of \$3,000,000 in the capital stock.

The bills receivable this year probably include the balances due from sales of land.

The dividend payable April 15, which will absorb \$1,660,000, and is nominally payable from the profits of 1883, it was not necessary to provide for during that year, 3½ months before it was payable, for nearly the whole of the net earnings of these 3½ months are available for the dividend payment, since of the total \$5,967,498 of yearly interest on the funded debt, only \$205,442 falls due between Jan. 1 and July 1.

Last year is the second that the gross and net earnings per mile of this road have increased, after decreasing for a series of years. For seven successive years the gross earnings per mile have been:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$5,784	\$5,492	\$5,016	\$4,777	\$4,445	\$4,746	\$5,201

Thus last year the gross earnings per mile were the largest since 1878, when the average length worked was but 1,539 miles.

The improvement in net earnings per mile last year is quite as marked, as is shown below:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$2,548	\$2,378	\$2,274	\$2,128	\$1,751	\$1,909	\$2,172

But the net earnings last year are still less than in any year previous to 1880, and they are decidedly small in comparison with most other important railroads. The Chicago & Northwestern, for instance, earned \$6,951 gross and \$2,889 net in its last fiscal year, which was less than for many years before. Now, as every addition of \$100 to the net earnings of the Milwaukee & St. Paul enables it to add 1 per cent. to the dividend, a comparatively small gain has a great importance. With net earnings per mile as large as the Northwestern's last year, the St. Paul could have paid 14 per

cent. on its stock instead of 7, without diminishing its surplus. Its capital stock is but \$9,967 per mile, and its funded debt \$20,225, and the yearly interest charge (with the debt as it was at the end of 1883) is but \$1,254 per mile.

With so large a proportion of new road and rolling stock as this road has, the expenditures for maintenance are likely to be below the average. We showed last year that the expenditure for renewals of rails were extraordinarily light then. They were larger in 1883, but still doubtless below the average requirements. For seven years they have been:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$277	\$145	\$140	\$160	\$89	\$52	\$64

The report says, however, that 207 miles of track were renewed, which is about 4½ per cent. of the road as it stood at the beginning of the year, which would renew the road in 22 years, and on a large part of the road the traffic is so light that steel rails ought to last as long as that; but at the beginning of last year two-thirds of the track was of iron. Moreover, the cost of renewing the 207 miles of road is given as \$325,431, or \$1,572, which is only \$18 per ton, and a pretty large allowance for the value of the old rails replaced must be made to bring the cost down to that. It is true, however, that when a railroad is once laid with steel the cost of renewing rails becomes comparatively an insignificant part of its expenses. Much more important are the expenditures for maintaining cars and locomotives. These increased on this road last year, especially repairs of cars, which were nearly 40 per cent. greater than in 1882, and were above the average expenditure per car, which has been for seven years:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$74.60	\$81.70	\$62.60	\$46.00	\$40.85	\$55.00	\$73.80

The expenditures for "repairs of track" (not including renewal of rails, and five times as great in amount) were about 3 per cent. less in 1883 than in 1882, notwithstanding 6 per cent. more road to be repaired. These have been:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$464	\$431	\$414	\$306	\$400	\$396	\$356

They were considerably below the average last year, but if all the new road completed was in really good condition when opened this would be likely to happen.

The expenditures per locomotive for repairs, however, were decidedly larger last year than in any other since 1876 at least. They have been for seven years:

1877.	1878.	1879.	1880.	1881.	1882.	1883.
\$1,349	\$1,236	\$930	\$948	\$1,076	\$1,321	\$1,450

Altogether the expenditures for maintenance were large last year. For five years they have been:

	1879.	1880.	1881.	1882.	1883.
Total....	\$2,152,900	\$3,247,727	\$3,727,467	\$4,478,933	\$5,037,864
Per mile.....	1,079	860	973	1,043	1,107

With larger traffic of course larger expenditures were to be expected, but the figures do not indicate any unusual scrimping in this direction.

This examination is undertaken because apparently the investing public does not believe that the results of the working the road are as favorable as the reports show. The common stock, on which 7 per cent. dividends have been paid for some time, and which a year and a half ago sold for 113 or so, now stands at about 88. The past winter has not been favorable, but the report for 1883 certainly indicates a considerably better condition of the property at the end of 1883 than the year before, when the stock sold for one-fourth more.

THE GRAVEST DEFECT IN MAINTENANCE OF WAY.

An interesting and suggestive little experiment may easily be made by any one interested in railroad track. It requires no apparatus, costs nothing, and calls for no special training other than an interest in the subject. It does not even require any time which could be made otherwise useful. We think it will be new to most of our readers.

The experiment is simply to seat oneself over the rear truck of the rear car of some ordinary passenger train, in the seat facing the rear, and to observe with close attention the sequence between undulations of the car due to defects of surfacing and impacts against the rail. The speed should be moderately high—depending on the condition of the track—but not too high, or the undulations and impacts will succeed each other so closely that the sequence of cause and effect cannot be easily followed. The car should not be a heavy sleeping or parlor car, but an ordinary eight-wheel passenger car. If the track be strictly first-class the speed must be pretty high to bring out the effect to which we refer, but on most track no dangerously high speed is required to answer all purposes.

Seating oneself in this manner and leaning hard against the side of the car, so that impacts of the wheels against the rail can be clearly perceived, the attention should be fixed solely on the effect of dips

below grade of the rail under the opposite side of the car, causing that side of the car to sink. By watching the rear window or car seats very slight depressions of this kind are easily perceived. If we attempt to watch both sides at once, or even allow the mind to take cognizance of dips on more than one side, the effects are so confused that it is hard to distinguish them one from another.

It will be found, first, that there are a great many more of these impacts of flange against rail than one notices when lightly leaning against the side of the car and not paying special attention to the matter, or even when simply watching, in a general way, "how the track rides." It will be found, secondly, that almost every jolt and impact which is sufficiently noticeable to be separately distinguished comes, not from defects of line or even from defects of surfacing common to both rails, but from defects in the level of the track, so that first one rail and then the other is the higher. Occasionally there are exceptions. Very disagreeable jolts will sometimes arise from defects common to both rails, especially in passing upon and off bridges and open culverts, which latter are very difficult to keep in good shape and which constitute a crucial test of the skill of the trackman, as most of them well know. Occasionally also, but very rarely, except at points of curve, disagreeable effects are felt from what may be seen by looking out of the window to be defects of line. But these exceptions only prove the rule, that disagreeable effects from imperfect track come from defects in the level of the rails.

The distinctness with which this can be perceived, when the attention is fixed on it as suggested, is really quite remarkable. We do not remember to have heard this "experiment" suggested, but nothing can be more effective in impressing upon an ignorant or careless man especially, the importance of keeping track level. The effect is not instantaneous. After perceiving a dip on the opposite side of the car, even if it be quite decided, the mind has abundant time to perceive that there has been a dip and that a certain effect is to be watched for—even sometimes to wonder that the effect expected does not follow—before it does follow. To do this requires quite an appreciable interval of time, as most of our readers know. Experimenters have determined in very curious fashion, down to minute fractions of a second, how much time is required for the perception and transmission of such sensations, and the variations in the time required are very curious; but all are far from instantaneous.

In the particular case we are discussing we should judge that there was an interval of from half a second to a second and a half, corresponding to from 20 to 60 ft. of distance, at a speed of 30 miles per hour. This interval of time makes it all the easier to see that with exceptions that prove the rule, an impact always follows the slightest dip, and its violence is proportioned, not so much to the extent as to the suddenness of the dip, as would naturally be expected. Sometimes the impact is so violent that the wheels bound back and forth from rail to rail several times, especially at high speed, which renders a very high speed unsuitable for the purpose. Sometimes the impact expected will be interrupted by some other defect of track, perceptible or not perceptible, and will not take place at all; but there is enough to satisfy any one, as we said before, that the one direction in which there is most room for improvement in track lies—not in getting a better line or a better surface or solid ballast—but in more care to maintain uniformity of level.

This is what might be expected from the means at command for correcting the various deficiencies of track. A good line is something which almost secures itself, because any defect forces itself upon the attention of every trackman and traveler and inspector. Fortunately for track-layers, as well as for astronomers and engineers, a ray of light is straight, and there are always enough rays of light lying around loose, so to speak, to put a straight-edge against a long stretch of track every time the trackman glances at it, whether he really intends to take that trouble or not. Therefore all track which is good at all is in good line. At least the defects which the eye can detect are of trifling relative importance. The same useful rays serve a very good purpose, by taking a little more trouble, to keep each rail separately in pretty good surface—if only both rails were alike. It is, of course, more difficult to maintain even one rail in good surface than in good line; for to have the surface remain good when loaded the ties must not only have a uniform bed but an equally solid one. Nevertheless, abrupt and sudden depressions in both rails at once—due to bad joints or careless tamping—are comparatively rare on anything like good track.

But the seemingly trifling irregularities in level are

almost incessant, even on very fine track, and against them we have no natural monitor like the ray of light to assist in detecting deficiencies. The only existing substitute is the track-level, which is prescribed for use on all of our well-managed lines, so far as we know, and which occasionally is used, though much less often than many roadmasters will admit or even know. A substitute which many trackmen favor, and many officers over them tacitly permit the use of, is the trackman's "eye," though just exactly how it can effectually assist in maintaining a level, or even uniform inclination, it would be hard to say. With the assistance of the cross-hairs of a telescope the eye may be able to do this, but the unassisted eye, although it can be made to detect whether a given continuous surface is a plane, is a wretchedly imperfect device for determining whether two given lines, like the tops of two parallel rails, lie in the same plane; and, in fact, is utterly incapable of doing so with any degree of precision, however well trained. Nevertheless the eye assists somewhat in reaching a rude approximation, so that many trackmen feel and express great confidence in it, and the poorer the trackman generally the better his "eye"—in his own opinion. Hence the level is, as a matter of fact, not used in track work to any great extent; not to an extent at all adequate to the necessities of the case or at all comparable with the enforced and constant use of the other implement which nature has provided to keep the line and surface in good order.

The track level, moreover, is not only an awkward tool to use—at least it takes some trouble to use it instead of being always present in working order like a ray of light—but it is also an imperfect tool. It does not cover the real necessities of the case, for what we really need is something which will not only indicate the relative level at some one point, but which will simultaneously indicate the relative level at points a considerable distance to either side. For, returning to our little experiment, it will often be found that when some one rail runs uniformly somewhat below the other for a considerable distance, even on a tangent, no bad effect takes place on the riding of the car. In fact, it sometimes seems as if the motion was smoother and better. Certain delicate experiments on rolling stock have seemed to indicate that there was a positive reduction of resistance from having one rail a little lower than the other even on a tangent, and although such a result could not be accepted as conclusive without further tests, yet it is a possibility, as to which we know of no theoretical or practical evidence to the contrary, and certainly the little experiment we have suggested here is not such. To tear up the track in all such cases, therefore, to restore an exact level, would result in great and perhaps useless labor, which would not be intelligently directed to correcting the worst defects first.

The end which seems to be desirable, therefore, is to have some monitor constantly before the eyes of the trackman, and always working without any assistance from him, which should reveal to him and enforce upon his attention, not only the absolute level of his track at various points, but its irregularities of level, in the same manner as a ray of light forces defects of line upon him. The question arises whether a coarse and large level permanently attached to the hand-car, in such manner as to be as conspicuous as possible and yet properly protected, might not subserve this purpose in great degree and prove a highly useful attachment. Probably it would, after the details of the attachment had been properly thought out and experimented on, and at least it is worth trying. The level should not be too sensitive, but it should make essential changes of level conspicuously visible, and should have some sort of a scale to indicate the amount of elevation on curves, if possible. Some little "cutting and trying" would no doubt be necessary to get just the right thing, but it is worth the trouble, even if the difficulty of getting a sufficiently large, clear and durable device should prove great or insuperable.

Consumption of Rails for Maintenance.

The complete statistics of rail production in the United States, collected by Mr. James M. Swank for the American Iron and Steel Association, are as follows for the past two years, in tons of 2,240 lbs.:

	1883.	1882.	Decrease.	P. c.
Bessemer rails rolled in Bessemer works	1,119,576	1,191,383	71,807	6.0
Bessemer rails rolled in iron rolling mills	29,133	92,684	63,551	68.2
Open-hearth steel	8,202	20,326	12,124	59.7
Iron rails	57,904	203,450	145,546	71.5
Total	1,214,905	1,507,852	292,947	19.4

The decrease is therefore considerable, but consists chiefly in iron, open-hearth steel and Bessemer rails rolled outside of Bessemer works, which were chiefly from imported blooms. The Bessemer works rolled but 6 per cent. fewer rails in 1883 than in 1882.

But there was also a decrease in rail production from 1881 to 1882, for in 1881 the production was 1,646,518 tons, and the decrease in two years has been 431,613 tons, or 26 per cent. The decrease from 1881, however, has been almost wholly in iron rails, and the production of Bessemer rails was largest in 1882. The production of iron rails, we see, has almost ceased, not one ton in twenty being of that material last year.

For 12 successive years the rail production has been:

Year.	Iron.	Steel.	Total.	P. c. iron.
1872	808,866	83,961	892,827	90.6
1873	860,520	115,102	975,622	88.2
1874	521,847	129,414	651,261	80.1
1875	449,901	259,099	707,000	63.6
1876	417,114	368,260	785,374	53.1
1877	296,911	385,805	682,716	43.5
1878	288,295	499,817	788,112	36.6
1879	375,143	618,851	993,994	37.7
1880	440,659	804,353	1,245,012	35.4
1881	430,273	1,210,285	1,640,558	26.5
1882	203,450	1,304,403	1,507,852	13.5
1883	57,904	1,156,911	1,214,815	4.8

The total production last year is even a little less than in 1880, but is 22 per cent. more than in any previous year. From 1878 to 1881 the production increased no less than 108 per cent., an average of 28 per cent. yearly, after which enormously rapid growth a decrease of 26 per cent. in two years is hardly to be wondered at. The decline in production of iron rails would have taken place long ago but for the extraordinary demand that began in 1879 and ceased only in 1882, which the existing steel works were unable to supply. Now the Bessemer works in this country are able to turn out more rails than the largest consumption of the country has ever been, and probably at a cost less than that of iron rails, the result of which is that substantially no iron rails are made, though some are re-rolled.

The whole supply of rails, that is, the production plus the imports, for six successive years has been:

	1878.	1879.	1880.	1881.	1882.	1883.
Iron	288,326	392,198	539,126	538,060	240,506	58,070
Steel	409,826	641,223	1,065,639	1,432,882	1,457,313	1,191,036
Total	698,152	1,033,421	1,604,765	1,970,942	1,707,819	1,249,106

Probably about 600,000 tons of rails went into new road last year, and as much as 1,000,000 tons in 1882, which would make the consumption for renewals and new second tracks and sidings of old roads about 700,000 tons in 1882 and 650,000 tons last year. Now, at the beginning of 1883 there were about 12,000,000 tons of rails in track; the year before, 11,000,000 tons. This makes the consumption of rails for renewals 6.36 per cent. of the rails in track in 1882 and 5.42 per cent. in 1883, the latter including not only the rails consumed for maintenance, but those used for new sidings and second tracks of old roads, of which probably a smaller amount than usual was constructed that year.

Now if they were all used for renewals, this is equivalent only to the renewal of the road once in 18.4 years, which is certainly a very much longer life than the average track will have, for by the returns to Poor's Manual at the end of 1883, 52 per cent. of the railroad track in the United States was still of iron. And this amount of iron track requires as much as 5,800,000 tons of rails. Now the aggregate production and imports of steel since 1871 had been but 7,000,000 tons; but of these 7,000,000 tons no less than 5,300,000 tons had been supplied since 1877, so that none was more than five years old, and substantially the whole of this should have been still in track at the end as well as at the beginning of last year. At the beginning of this year the indications are that there were about 12,600,000 tons of rails in track, of which 6,800,000 tons were steel. The quantity of steel used before 1872 was extremely small, so small that it may safely be neglected entirely, but we cannot say just how great it was, as before 1872 the imports of steel and iron rails were not reported separately. But the imports had been increasing, and yet in 1872 they were but 133,738 tons, and the total production of this country previous to 1872 (it began in 1867), was but 81,746 tons. Thus the quantity of steel in track must have been insignificant at the close of 1871. Since that time the aggregate supply has been (including 1883), about 8,250,000 tons, and about 6,800,000 tons of this was in track at the end of last year, so that 1,450,000 tons of steel were used for renewal of steel in these 12 years. We may safely assume that none of the steel rails (except a few rails that broke) laid in 1881, 1882, or 1883 required renewal in 1883, and this gives us the whole of the 1,450,000 tons for the renewal of the 5,300,000 tons of rails laid before 1881, which is 27½ per cent. of them.

As we have no data to show what the yearly renewals of steel have been we cannot say what the average life has been; but it must have been quite long, though we must bear in mind that but a small proportion of these rails were laid in the earlier years—less than 8 per cent. before 1875, and but 27½ per cent. before 1878.

So long as any iron remains in track we shall not be able to determine from the statistics of production

and consumption what the average life of steel rails has been, but we may approximate to it.

By calculations made in previous years we have found the percentage of rails consumed for renewing old track and constructing new second track and sidings to have been:

Year.	Per cent.	Year.	Per cent.
1872.....	10.30	1878.....	6.66
1873.....	9.02	1879.....	7.24
1874.....	7.34	1880.....	9.52
1875.....	7.33	1881.....	11.16
1876.....	7.10	1882.....	6.36
1877.....	5.92	1883.....	5.42

It is noticeable that after the period of rapid railroad construction which ended in 1873 the consumption for maintenance decreased very rapidly, but it also increased very rapidly when the work of construction became active again, but has decreased again, now that construction has decreased. This is not so remarkable as it may seem. After 1878 and again after 1881 a very large proportion of all the railroad in the country was new, the rails but a few years old, and likely to require scarcely any renewals. Moreover, railroad construction is usually active at times when traffic presses, and it is when traffic presses that new sidings and second tracks are made, and the consumption for these we have had to put with for renewals, because we have no separate account of them. Moreover, these are times of large profits, and renewals are made freely then. Thus, after 1878 and after 1881, there was doubtless an extraordinarily large proportion of new rails in the tracks, the consequence of which is that for some years the requirements for maintenance are below the average. All these causes working together seem to have reduced the percentage of rails renewed one half from 1881 to 1883.

More than half the rails in track now are steel. They are in those tracks which are exposed to the greatest wear, and it is probable that from three-fourths to seven-eighths of all the traffic of the country passes over steel. We must, then, be approaching the time when the average maintenance will be lowest. What that will be we cannot yet determine. When the rate went below 6 per cent. in 1877 it seemed that this was a permanent result of the use of steel; but soon afterward, though the proportion of steel became greater and greater, the percentage increased and became as large as when the tracks were nearly all iron. We see, then, that we may not conclude the average rate from the results of one or a few years. But for the large proportion of iron still in track we might be perfectly certain that the renewals last year were below the average requirements, because about 34,000 of our 120,000 miles of railroad are but four years old or less.

The New York, Lake Erie and Western statement of earnings and expenses in January is made available for comparison by giving a separate statement of the earnings of the Erie proper, in addition to that covering 68 per cent. of the gross earnings and the whole of the working expenses of the New York, Pennsylvania & Ohio.

For the Erie proper the figures have been for seven successive years:

	Gross earnings.	Expenses.	Net earnings.
1878.....	\$1,304,018	\$959,793	\$344,225
1879.....	1,147,173	960,031	187,142
1880.....	1,336,381	946,565	389,816
1881.....	1,443,457	1,137,988	305,469
1882.....	1,318,906	1,136,214	182,692
1883.....	1,524,869	1,220,292	304,577
1884.....	1,272,331	1,098,257	174,074

The gross earnings were thus smaller this year than in any other of the seven except 1879, and though the working expenses were the smallest since 1880, the net earnings were less than in any other of the 76 months since the reorganization, and \$130,503 (42½ per cent.) less than last year. Including the leased line the net earnings of the two roads after paying the rental were only \$85,773, so that there was a loss of \$88,301 on the lease. In a lease of the kind a loss is to be expected in some months, and it will be entirely justified if the profits barely balance the losses, as the advantages of the connection to the lessee are important even if there are no profits.

The Erie's gross earnings and expenses being given, and the sum of them and the 68 per cent. of the Ohio road's earnings and the whole of its expenses, we are able to ascertain the gross and net earnings of the New York, Pennsylvania & Ohio separately, which have been for six years, not including last year:

	Gross earnings.	Expenses.	Net earnings.
1878.....	\$298,976	\$223,769	\$75,207
1879.....	298,647	273,686	24,961
1880.....	412,367	274,979	137,386
1881.....	431,346	322,513	108,833
1882.....	409,059	324,110	84,949
1884.....	433,645	383,181	50,464

It seems, then, that this road did not have small gross earnings last January, and that the loss on the lease was due to its exceptionally large working expenses, which were 88 per cent. of the earnings, and as the rental

was 32 per cent. the Erie had to pay 120 per cent. of the earnings for expenses and rental.

For the four months ending with January the earnings and expenses of the Erie have been:

	Gross earn.	Expenses.	Net earn.
1877-78.....	\$5,875,437	\$3,857,046	\$2,018,391
1878-79.....	5,207,851	3,577,415	1,630,436
1879-80.....	5,924,157	3,950,654	1,973,503
1880-81.....	6,867,472	4,432,732	2,434,740
1881-82.....	6,430,540	4,591,114	1,839,425
1882-83.....	6,854,109	4,707,236	2,146,873
1883-84.....	6,304,896	4,547,833	1,757,063

Thus the gross earnings for the four months this year have been exceeded only last year and in 1880-81, but the net earnings were smaller than in any previous year except 1878-79 and 1881-82—the latter being the worst period of the railroad war. Compared with last year there is a decrease of \$359,210 (5½ per cent.) in gross earnings, of \$159,418 (3.4 per cent.) in working expenses, and of \$199,792 (9½ per cent.) in net earnings. There were very large gains in October, which have been more than counterbalanced by the large losses in December and January.

The earnings and expenses of the New York, Pennsylvania & Ohio for these four months have been:

	Gross earnings.	Expenses.	Net earnings.
1877-78.....	\$1,408,615	\$983,200	\$425,355
1878-79.....	1,322,391	1,084,001	238,390
1879-80.....	1,702,734	1,230,085	472,649
1880-81.....	1,866,224	1,294,894	571,330
1881-82.....	1,818,548	1,328,075	490,473
1883-84.....	2,186,781	1,576,507	610,274

Thus the gross and net earnings of this road for the four months were decidedly larger than ever before, the increase being \$368,293 (20 per cent.) in gross earnings, \$248,432 (18 per cent.) in working expenses, and \$119,801 (24½ per cent.) in net earnings. But the net earnings were not quite equal to the rental, and consequently \$89,496 of it had to come out of the Erie's net earnings, leaving them after paying rental \$1,858,562.

Union Pacific earnings and expenses in January make a very unfavorable showing, as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Miles.....	4,530	4,170	+	360
Gross earnings.....	\$1,538,908	\$1,916,854	—	\$377,946
Expenses.....	1,305,364	1,019,122	+	286,242
Net earnings.....	\$233,544	\$897,732	—	\$664,188

It was bad enough that the gross earnings should have fallen off 20 per cent., but when in addition expenses increased 28 per cent., three-fourths of the net earnings are annihilated, leaving them the insignificant amount of fifty-one dollars per mile, which is only enough to pay 6 per cent. on a capital of \$10,200 per mile.

For four successive years the miles worked and the gross earnings in January have been:

	1881.	1882.	1883.	1884.
Miles worked.....	3,300	3,650	4,170	4,530
Gross earnings.....	\$1,389,215	\$1,963,000	\$1,916,854	\$1,538,908
Earn. per mile.....	421	538	460	330

Some increase in working expenses was to be expected with the larger mileage, and the weather also was more unfavorable than last year, and traffic is more likely to be suspended by bad weather on the new branches with a very few trains than on the old road, but traffic so suspended is not usually lost. Probably a considerable part of the decrease, however, was due to a diversion of through traffic to competitors, and lower rates on the rest of it. Still the decrease in net earnings is surprisingly large. And the smallness of the net earnings cannot be charged to large working expenses, for though these were an extraordinarily large proportion of the earnings (85 per cent.); they were a much smaller amount than in any previous month since July. For five successive months the gross and net earnings and working expenses have been:

	Sept.	Oct.	Nov.	Dec.	Jan.
Earn.....	\$2,994,076	\$3,060,409	\$2,731,722	\$2,407,215	\$1,538,908
Exp.....	1,535,188	1,720,443	1,708,884	1,730,889	1,305,364
Net.....	\$1,458,888	\$1,339,966	\$1,022,838	\$676,326	\$233,544

Thus we see that the working expenses were nearly one fourth less in January than in December, which is as large a decrease as could be easily effected without taking off a large proportion of the trains; and it is to the decrease of \$868,000 (36 per cent.) in gross earnings that the enormous falling-off in net earnings was due. These latter were nearly three times as great in December as in January, four and one third times in November, and about six times as great in September and October.

The course of gross earnings on this road has been curiously like that on the Chicago, Burlington & Quincy, as shown below:

	C. B. & Q.	U. P.
September.....	\$2,909,165	\$2,994,076
October.....	2,742,479	3,060,409
November.....	2,562,753	2,731,722
December.....	2,170,918	2,407,215
January.....	1,648,220	1,538,908

The Union Pacific's maximum was \$151,000 more than the Burlington's maximum; the Union Pacific's minimum is \$110,000 less than the Burlington's minimum. The earnings of the Burlington fell off \$392,000 and of the Union Pacific \$324,500 from November to Decem-

ber; from December to January the decrease was \$522,000 on the Burlington, and \$869,000 on the Union Pacific.

Doubtless the same causes have affected both to a considerable extent; but their competition with each other can hardly have caused more than a small part of the great decrease in January.

So far this has been a year of receiverships. The Portland & Ogdensburg, which has this week been placed in the hands of a receiver, is the eighth road which has thus been taken under the protection of a court since the year opened, and there are several more cases in which the same proceeding is threatened. The companies for which receivers have been appointed are the New York & New England, the Texas & St. Louis, the Connotton Valley, the Brooklyn, Flatbush & Coney Island, the St. Louis, Hannibal & Keokuk, the Cincinnati, Columbus & Hocking Valley, the Shenango & Allegheny and the Portland & Ogdensburg, and to these should be added the North River Construction Company, although the last-named receivership does not include the possession of any road.

The list, although sufficiently long, includes only two companies of importance, the New York & New England and the Texas & St. Louis. In the case of all the companies there was no sudden default or break-down, but all of them had been for some time gradually going down into bankruptcy, and the receiverships were not unexpected. Two, the Texas & St. Louis and the Connotton Valley, are new roads, which have been built largely on borrowed money, but have failed to secure the business which their projectors expected, while all the others are old companies which have gone down either because they had never had the business to support them or because their traffic, while considerable in amount, was not profitable in its nature.

It is to be expected that the process of liquidation thus begun will be continued, and it is altogether probable that the present year will be an uncomfortable one for weak companies which are burdened with a heavy debt or have built badly placed or unnecessary roads. This sifting process always follows a period of great activity in railroad building, and although it is unpleasant while it lasts its results are generally beneficial.

These bills for changing the patent laws are now before Congress, one, introduced by Mr. J. A. Anderson, of Kansas, by which the life of all new patents would be reduced from 17 years to 5; and the other, introduced by Senator Voorhees, of Indiana, providing that it shall be a valid defense to any suit or injunction for infringement that the defendant, or his assignor, purchased the patented article for use or consumption, and not for sale or exchange, in good faith and in the usual course of trade, without notice that the seller had no right to sell such article; and that notice received after such purchase shall not have the effect to impair in any way the right of such purchaser as absolute owner.

The first of these bills, cutting down the life of a patent to five years, practically destroys the whole value of a patent at once; for it is a rare exception that a patent, even now, returns any profit over expenditures during the first five years of its life. If the certainty of twelve years longer life were destroyed it would probably be almost impossible for the inventor to derive any profit from his patent, even in the rare instances where he is now able to do so during the proposed five years law.

The provision of the second bill that previous notice that a device is patented must be given would be evaded by sending out a flood of circulars all over the country to all possible purchasers, immediately on the granting of a patent. If this were all, therefore, the law would do neither good nor harm, except to introduce a new annoyance. But the provision that notice must be given that the seller had no right to sell the article is in the nature of things impossible to fulfill in advance. It strikes at the very foundation of legal ownership in any class of property whatever by providing that any man who chooses to sell another man's property, without right from him, shall nevertheless be able to give valid title.

These bills have been urged chiefly by Western farmers, who complain that the monopoly conferred by a patent has caused them to pay an excessive price for barbed wire fence, of which they take enormous amounts, because it is much cheaper than any other effective fencing; and who have suffered much from swindlers who have sold them patented articles without license from the patentees, while the latter, on discovering this naturally have insisted on their rights. These evils are to some extent inherent in any monopoly of the kind, but the patent laws are not to be judged by them alone, but by their

aggregate effect. They offer a few brilliant prizes and many blanks, but the prizes can be won only by the inventor who confers on the community what is worth more than is paid for it, high as the price may be. The result has been to stimulate experiment and research to an extraordinary degree, the great prizes being before the eyes of every one. Such a modification of the patent laws as these bills propose would be nearly equivalent to their abolition, and the result doubtless would be that there would be decidedly fewer valuable inventions, the valuable ones being generally the fruit of much study and experiment, which very few would devote if there was no chance of reward.

The further reduction of east bound rates last week from 20 cents to 15 cents per 100 from Chicago to New York was followed by an increase of shipments, while the reduction from 30 to 20 the week before had no such effect on the traffic as a whole, as we showed last week. For the last four days of the 30 cent rate the average daily shipments were 556,846 bushels for the six days of the 20 cent rate they were 494,929 bushels.

For successive days since they have been:

March 21.	March 22.	March 23.	March 24.	March 25.	March 26.
584,384	566,650	608,493	849,908	648,697	

The average of these is 651,626, which is 31½ per cent. more than under the 20 cent rate, and yielded about 1 per cent. less gross earnings.

It is noticeable that there has been no increase in shipments of corn, but a very large one in wheat, and, this week, in oats. The wheat shipments before the 20-cent rate had averaged about 50,000 bushels daily for some weeks; under the 20-cent rate they averaged 56,330 bushels, but for the first four days of the 15-cent rate the average was 106,937 bushels per day. This, however, was not effected by the lower rates alone, but also by a fall in the price of grain at the sea-board as well as in the West.

The effect of the last reduction of rates on prices of grain seems to have been very slight, if anything. The price of wheat has fallen, but fully as much, apparently, at Chicago, as at New York leaving the difference in price about the same with a transportation rate of 9 cents a bushel as when it was 12 cents and 18 cents. But we showed last week that the difference in price was but 9½ cents even when the regular price for the transportation was 18 cents a bushel. And in corn there has been scarcely any change of price at either place, and the difference in price is rather less than the cost of transportation at the 15-cent rate.

The Chicago-St. Paul lines have at last agreed to pool the St. Paul and Minneapolis traffic and to submit the division of the business to arbitration, which had been the sticking point. The pool is to be for two years, but at the expiration of the first year any road may demand a new allotment of traffic, which shall be submitted to the arbitration of Mr. Geo. M. Bogue, who was Arbitrator for the old Northwestern Association, which did not divide the traffic, but attempted to maintain rates without a division—an almost hopeless task.

The government tests of iron and steel, begun some years ago at the urgent solicitation of the manufacturers and users of iron in the country, and especially of engineers, have long been suspended for want of appropriations, which are apt to be lacking when the expenditures are not to be made by politicians. The War Department estimates this year ask an appropriation of \$80,000, of which \$50,000 is for a machine to test tension and compression of materials, which will supplement the powerful and delicate machine heretofore acquired and now at the Watertown Arsenal, \$15,000 for caring for and using the latter machine, which has been left almost useless for want of an appropriation, and \$15,000 for purchasing and preparing materials for specimens and tests.

The Board of Direction of the American Society of Civil Engineers understands that if these appropriations are made part of the tests will be made under the Society's programme; and it asks members of the Society to use their influence in favor of these appropriations, which is a recommendation that may well be heeded by railroad officers not members of the Society, as it is probably more important to the railroads than to any other one interest to have definite knowledge of the qualities of iron and steel.

February Accidents.

Our record of train accidents in February, given in full elsewhere, contains notes of 31 collisions, in which 13 persons were killed and 40 hurt; 71 derailments, in which 9 persons were killed and 109 hurt, and 8 other accidents, in which one person was hurt—a total of

110 accidents, in which 22 persons were killed and 150 injured.

As compared with the preceding month, January, there was a decrease of 37 accidents, of 34 killed and of 90 injured. As compared with February, 1883, there was a decrease of 74 accidents, of 39 killed and of 36 injured.

These accidents are classed as to their nature and causes as follows:

COLLISIONS:	
Rear.....	17
Butting.....	13
Crossing.....	1
Total.....	31
DERAILMENTS:	
Broken rail.....	10
Broken bridge.....	3
Spreading of rails.....	6
Broken axle.....	2
Accidental obstruction.....	9
Cattle.....	2
Land-slide.....	4
Wash-out.....	2
Snow.....	2
Wind.....	1
Misplaced switch.....	11
Open draw.....	2
Malicious obstruction.....	1
Purposely misplaced switch.....	1
Unexplained.....	15
Total.....	71
OTHER ACCIDENTS:	
Boiler explosion.....	1
Cylinder head blown out.....	2
Broken axle not causing derailment.....	3
Broken wheel not causing derailment.....	2
Total.....	8
Total.....	110

Four collisions were caused by mistakes in orders; three by trains breaking in two; two by flying switches; two by misplaced switches, and one by fog.

Of the three broken bridges one was caused by the washing out of abutments; of the others we have no special particulars.

No less than 13 accidents—2 collisions and 11 derailments—are charged to misplaced switches, showing an increase in that form of carelessness.

There were two malicious derailments during the month, one caused by misplacing a switch, the other by obstructions placed on the track. In the latter case the train-wreckers have since been arrested.

A general classification of these accidents is as follows:

Defects of road.....	Collisions.....	Derailments.....	Other.....	Total.....
Defects of equipment.....	3	3	8	14
Negligence in operating.....	27	13	..	40
Unforeseen obstructions.....	1	19	..	20
Maliciously caused.....	..	2	..	2
Unexplained.....	..	15	..	15
Total.....	31	71	8	110

Negligence in operating thus included 36 per cent. of all the accidents, furnishing a larger proportion than any other class. Probably some of the unexplained derailments should be added to those caused by defects of road.

A division according to classes of trains and accidents is as follows:

Accidents.....	Collisions.....	Derailments.....	Other.....	Total.....
To passenger trains.....	3	33	5	41
To a pass. and a freight.....	6	..	..	6
To freight trains.....	19	38	3	60
Total.....	31	71	8	110

This shows accidents to a total of 141 trains, of which 53, or 37.6 per cent., were passenger trains, and 88, or 62.4 per cent., were freight trains. As has been before noted, the proportion of freight-train accidents which escapes notice and record is certainly very much greater than that of passenger-train mishaps.

There were 61 accidents noted as happening in daylight and 49 at night.

The persons killed and injured were as follows:

	Killed.....			Injured.....		
	Em- ployés.....	Others.....	Total.....	Em- ployés.....	Others.....	Total.....
In collisions.....	13	..	13	32	8	40
In derailments.....	8	1	9	33	76	109
In other accidents.....	..	..	..	1	..	1
Total.....	21	1	22	66	84	150

Of the killed 95½ per cent. and of the injured 44 per cent. were employés, who thus furnished 50½ per cent. of the whole number of casualties.

Of the 172 persons killed or hurt 53 received their injuries in collisions, 118 in derailments and but 1 in the other accidents. Deaths were caused by 8 collisions and 7 derailments; injuries by 9 collisions, 16 derailments and 1 other accident. In all 15 accidents caused death and 26 lesser injuries, leaving 69, or 63 per cent. of the whole number, in which no serious injury to persons is recorded.

The bad weather which prevailed through January continued through February. The month was marked by severe cold, alternating with storms of snow or rain, according to the locality. We find accordingly many accidents resulting from the weather, either directly or indirectly, while it is to be noted that others which might be expected are, singularly enough, almost entirely absent. Thus only three broken axles and two broken wheels appear in the record, and none of them caused derailment. Possibly this may have resulted from stricter inspection and the exercise of greater care in running, which the unfavorable condition of the weather may have called for.

There were 10 accidents—one of them the most serious of the month—resulting from broken rails. To illustrate the effect of the weather we here compare the number of accidents resulting from broken rails in the three winter months—December, January and February—with those in the three summer months—June, July and August—for four years past:

	1883-84.	1882-83.	1881-82.	1880-81.
Winter months.....	35	59	14	62
Summer months.....	5	6	8	5

The difference is sufficiently marked, even in the mild and open winter of 1881-82. In the four years the winter

months thus show a total of 170 accidents resulting from broken rails, against 22 in the summer months, or over 7½ times the number. And it may be added that a comparison of the different winters will show a close correspondence between the severity of the season and the number of broken rails. In the winter just closed, for instance, the decrease as compared with the previous year was chiefly in December, and last December was not a severe month, the winter storms and extreme cold not coming until late.

It is to be regretted that the number of misplaced switches continues so large, showing no indications of a decrease in this very mischievous form of carelessness.

A marked feature of the record is the small number of collisions. The proportion of that class of accidents to the total number was smaller than for many months past. This was probably in part due to the fact that February was, on most roads, a month of light traffic, with fewer freight trains in motion than for almost any month of the past year perhaps it may have resulted in part from the greater caution which trainmen are apt to exercise in running in stormy and unfavorable weather.

For the year ending with February the record is as follows:

	Accidents.	Killed.	Injured.
March.....	142	13	137
April.....	106	26	114
May.....	120	28	77
June.....	91	38	95
July.....	119	57	204
August.....	144	42	136
September.....	158	44	183
October.....	174	43	234
November.....	122	34	235
December.....	112	32	113
January.....	147	56	240
February.....	110	22	150
Total.....	1,545	435	1,918

Total, same months, 1882-83..... 1,395 304 1,589
" " " 1881-82..... 1,372 425 1,613
" " " 1880-81..... 1,230 334 1,304

The yearly average for the four years was 1,388 accidents, 397 killed and 1,606 injured, which is much below the totals for last year in all respects.

The averages per day were, for February 3.79 accidents, 0.76 killed and 5.17 injured; for the year, 4.24 accidents, 1.19 killed and 5.24 injured, these being considerably above the averages for the month.

The averages per month for the year were 129 accidents, 36 killed and 160 hurt, these figures being considerably above the statement for February in all respects.

The average casualties per accident for the month were 0.200 killed and 1.364 hurt; for the year they were 0.282 killed and 1.241 injured, showing for the month an increase in injured, but a decrease in killed.

Dr. Isaac Todhunter, whose death has recently been announced, will long be famous among mathematicians for the excellent and thorough character of his mathematical text-books, ranging from Algebra to the Calculus of Variations, which were when published and are still distinguished among other text-books by the prominence given to illustrative examples and problems. His books have been said to be written on the principle of "little theory and plenty of practice," and the reader who wishes to test, or to perfect, his knowledge of algebra or any of the higher branches cannot do better than to get one of Todhunter's works. Such excellent collections of mathematical problems can be found nowhere else.

The imports of rails into the United States in 1883 as reported by our Bureau of Statistics differ greatly from the exports from Great Britain to this country as reported by the Board of Trade, and that not by being greater, as might be the case, due to imports from countries other than England, but by being very much less. The figures are:

	1883.		1882.	
	Steel.	Iron.	Steel.	Iron.
U. S. imports.....	34,125	676	102,620	37,447
British exports to U. S.....	69,346	2,693	173,876	21,135

Of course the British exports do not all get here the year they are exported, especially as a very large proportion of them of late have gone to the Pacific coast, a voyage of four months or more. But that should make our imports exceed the exports to this country in 1883, rather than fall short, for the monthly exports have been decreasing rather than increasing, and in the early months of 1883 we should have been receiving the 23,642 tons exported hither from England in October, 1882, while in none of the last four months of 1883 were the exports as much as 7,000 tons.

The imports reported by the Bureau of Statistics, we see, were but 34,801 tons, against 200,067 in 1882, a decrease of 86 per cent.; and the last year's imports were scarcely enough for 400 miles of track laid with 56 lb. rails.

The through rail shipments eastward from Chicago for the week ending March 15, by the complete report, have been, for five successive years:

	1880.	1881.	1882.	1883.	1884.
Tons.....	67,413	52,968	47,567	69,696	47,135

Thus the shipments this year were 22,561 tons (32½ per cent.) less than last year, nearly the same in 1882, 11 per cent. less than in 1881, and 30 per cent. less than in 1880, in which latter year the March shipments were enormous.

The percentage of the shipments carried by each route this year and last in this week were:

	1884.	1883.	1884.	1883.
C. & Grand T.....	13.6	14.2	Ft. Wayne.....	18.7
Mich. Cen.....	12.6	24.0	C. St. L. & Pitts.....	3.0
Lake Shore.....	16.4	18.7	Balt. & Ohio.....	8.9
Nickel Plate.....	7.8	..	Chl. & Atlantic.....	19.0

Thus this year the three Vanderbilt roads carried but 36.8 per cent. of the whole; the two Pennsylvania roads but 21.7; the one road carrying much more than its share was the Chicago & Atlantic, which is short in the pool; but the Grand Trunk, which has a vast amount over which it owes

to the other roads, increased its debt a little during the week. For two days of this week the 20-cent. rate was in force.

For seven successive weeks the Chicago shipments have been :

Week ending—						
Feb. 2.	Feb. 9.	Feb. 16.	Feb. 23.	March 1.	March 8.	March 15.
40,727	41,834	38,732	45,014	37,778	42,462	47,135

Thus the shipments in the last week were 13% per cent. more than the week before, and more than in any other week of the seven. Something of this may have been due to the reduced rates.

The incomplete report to the Chicago Board of Trade of through and local shipments eastward of flour, grain and provisions, for the week ending March 22, gives a total of 54,357 tons, against 70,708 in the corresponding week of last year and 49,106 in the previous week of this year. Last week the 15-cent rate was in effect two days. This had some effect on the shipments, but it did not make them large.

The percentages of the different roads show no very great variations from the allotments, but the complete report for the through shipments will probably show larger ones, as the Chicago & Atlantic, the Nickel Plate and the Baltimore & Ohio, which carried a percentage of all freight, much more than their allotment of through freight (39.6 per cent. against 26 per cent.), do not carry much local freight. The Michigan Central carried an unusually small proportion, while it had had a large one for a time previously, and the two Pennsylvania roads also carried much less than their share, which, however, is what they have been doing for a long time.

Of the total shipments 12,247 tons were flour, 37,902 grain, and 4,208 provisions.

The exports of wheat from India for five crop-years (ending with March) have been, in bushels :

1877-78.	1878-79.	1879-80.	1880-81.	1881-82.
11,834,946	1,950,123	4,093,360	13,896,168	37,078,570

For the last two calendar-years the exports have been :

Bushels.	1883.	1882.	Increase.	P. c.
	34,050,940	24,239,789	9,811,151	40.5

For three years past, thus, the Indian exports have been important in amount. They have been, however, very small in proportion to the consumption of grain in India, which has 250 millions of inhabitants, who have for the most part little but grain to eat, and probably consume 1,000 million bushels or more, of which perhaps two-thirds is rice. A comparatively small percentage of production for the requirements for home use thus affords a large amount for export.

The origin of the standard railroad gauge of 4 ft. 8½ in. is attributed, in a paragraph which is going the rounds to the newspapers, to George Stephenson, who, it is said, "when about to build the first railroad," was troubled somewhat on this point, and settled it by taking a rule and measuring the distance between the tracks of an ordinary wagon. As there were railroads before George Stephenson was born we can hardly accept this. Those first built in England were simply flat beams or planks on which ordinary carts ran, with flanges neither on wheels nor rails; as early as 1650 there was such a road in England, which extended for some distance outside of a mine, as well as inside, the rails of which, at the places most exposed to wear, were fortified by wrought-iron plates; and as early as 1765 there was a railroad there with regular wooden rails attached to longitudinal sleepers, on which ran cars with cast-iron flange wheels. On steep grades or curves a thin plate of iron was spiked to the rail. The first regular iron rails were used in 1767, and on these wagons without flange wheels ran. But in 1776 a coal-mine railroad was built with cast-iron rails, having a flange on the outer edge, on which moved vehicles of the ordinary gauge in England, 5 ft. between outside edges of wheels. It is this railroad, which was built at the Sheffield coal mines, that seems to have established the standard gauge, for when it was decided to use flanges on the insides of the wheels the old vehicles and the old road fitted each other with a distance of 4 ft. 8½ inches between the inner edges of the rails.

An "esteemed cotemporary" says :

"There is on exhibition at the Eastern Railroad engine house, Prison Point, Boston, an engine built at the Portland Locomotive Works for the Northern Pacific Railroad. It has the Joy valve motion, the first ever used in this country; it does away entirely with eccentric links; the valve works from connecting rods and has Butterfield's ash-pan. It weighs 40 tons, has 17 by 34-in. cylinders, 62-in. drivers. It is an entire revolution in engine-building, and on the first run is said to have worked well."

We are very thankful to hear that eccentric links are at last to be done away with: we never recollect meeting one even on the darkest night, but no doubt they are dreadful things to encounter. We cannot but admire the thoughtfulness of the designer of the engine in providing the valve with an ash-pan. It quite reminds one of the White Knight in Alice in Wonderland who always took a mouse-trap with him when he rode on horseback. The mouse-trap might be useful in assisting a timid rider to jump a five-barred gate, and similarly the ash-pan might assist the valve in giving a sharp cut-off, though it is difficult for the ordinary mind to see just how it is done. A brilliant thought strikes us—possibly the ash-pan might be useful should the valve gear take fire, which seems not unlikely, if it really weighs 40 tons, as stated. On the whole we can cordially indorse the remark that it is an entire revolution in engine-building and can understand our cotemporary's evidently gloomy misgivings as to the future behavior of this eccentric missing-link 40-ton patent ash-pan valve. The cautious statement "on

the first trip it is said to have worked well" shows a creditable doubt as to the ultimate success of this singular combination.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows :

Cahaba Coal Mining Co.—This company has completed a road from the Cahaba Mines, Ala., to the South & North Alabama road, 9 miles.

St. Louis & Cairo.—The *High Prairie Branch* is completed from Columbia, Ill., to Millstadt, 14 miles. Gauge, 3 ft.

This is a total of 23 miles of new railroad, making 334 miles reported to date for 1884. The total track reported laid to the corresponding date for 12 years is as follows:

	Miles.		Miles.
1874.....	334	1878.....	226
1875.....	521	1879.....	165
1876.....	1,180	1880.....	304
1877.....	541	1881.....	139
1878.....	975	1882.....	429
1879.....	298	1883.....	439

These statements include *main track only*, no account being taken of second tracks or other additional tracks or sidings.

NEW PUBLICATIONS.

Report of the New York State Survey for 1882. James T. Gardiner, Director.

The state survey of New York drags its slow length along at the rate of about \$15,000 per year, which cannot be expected to give very rapid progress. Apparently the progress which has been made is not a bad showing for work of the kind. The report contains lists of elevations and geographical position for numerous places in Eastern and East-central New York, an article on trigonometrical levelling and considerable other information of value to those who are interested in that kind of technical work.

Report of the New York State Survey for 1883. James T. Gardiner, Director.

In addition to extending the list of geographical positions and elevations determined, this report contains details of work done in western New York in respect to reclaiming swamps, and a general discussion of the flow of water from wooded and other water-sheds.

Tables for Calculating the Cubic Contents of Excavations and Embankments, by an Improved Method of Diagonals and Side Triangles. By John R. Hudson, C. E., New York: John Wiley & Sons.

This method adopts the same device for dividing the surface of the ground into triangles as is familiar—to the eye—of most engineers from its appearing in Henck's "Field book." But we apprehend that it has rarely been used in practice. These tables make the method somewhat easier to use, but we cannot recommend the method itself, seeing no possible gain from it, either in accuracy or convenience.

Are we to understand the author as seriously recommending that earthwork computations should be carried out to tenths of a cubic yard in practice? We regard that as an utter waste of time, in view of the accuracy of the field-work.

Useful Information and Tables Appertaining to the Use of Wrought Iron. The Passaic Rolling Mill Co., Paterson, N. J.

This is a convenient little manual for designers of iron work, especially for those who may have occasion to order from the works, of much the same style and general character as others prepared for the same purpose by other works, but less complete than some. The tables, of course, are more particularly confined to the strength and weight of rolled iron used as beams and posts, the latter very briefly treated; but much of the matter seems new. The miscellaneous contents do not seem to have been very carefully compiled and edited. They cover considerable ground, but are hardly full enough to avoid the need of reference to other and more complete treatises. The same criticism may be made, however, on most of the other existing trade publications of the kind.

The Air We Breathe and Ventilation. By Henry A. Mott, Jr., Ph. D., E. M., F. C. S., etc. Published by John Wiley & Sons, New York.

This little book describes in the first place the constituents of the atmosphere, and, after dwelling on the importance of pure air, proceeds to describe the aspirating system of ventilation, as the writer considers the principle on which that system is founded to be correct. The leading idea of this principle is that the foul air should be removed by suitable contrivances, and that if this point is carefully attended to the fresh air will take care of itself, finding an entrance and supplying the place of the foul air. Various methods of applying this principle to ventilation and heating are described, and the Cameron and Gouge systems of ventilating cars are illustrated and explained.

A great deal of useful information is conveyed in a concise and convenient form, and altogether the book is calculated to fill a want, though unfortunately it is marred by several instances of hasty writing. The reader is informed on page 7 that "at a height of 5,528 metres the air expands to twice its volume," while on page 8 it is stated that "at 2.7 miles above the earth the pressure would be reduced about one-half," and again on page 7, "at a height of 3,522 geographical miles it expands to 64 times its volume." These statements are wholly irreconcilable, two out of the three are certainly wrong, and if the other is correct it is

puzzling to the student to find figures given in three different measures, metres, miles and geographical miles, which can only be compared by reducing them to a common denomination. An author should save the reader this trouble. It would also be convenient to know whether the height above sea level, or the height above the surface of the earth, is intended. The author states, "The density of the air diminishes as the distance from the earth's level increases." The "earth's level" is a novel phrase, and we must confess our inability to grasp its exact meaning, but the statement hardly conveys the idea that the barometrical pressure is considerably smaller on an elevated tableland than at sea level, and that this fact is often made use of by engineers and surveyors to determine roughly the heights of mountains and passes.

The author speaks of the West Indies and tropical India as being in the south. It is generally believed that these regions lie to the north of the equator. "In the zone from 12° north to 12° south latitude the heat is never oppressive, and the large amount of moisture in the atmosphere is as congenial to the health of man as it is favorable to the growth and development of vegetation." This statement is somewhat remarkable, and if correct Aspinwall and the Gulf of Guinea should be among the healthiest instead of the most unhealthy regions of the globe. There is no accounting for taste, and possibly some people may like yellow fever.

The Topographer: His Instruments and Methods. By Lewis M. Haupt, A. M., C. E., Prof. Civ. Eng. University of Pennsylvania. New York: J. M. Stoddart.

This book fills tolerably well a real void in technical literature; and every one charged with topographical field work should have it. It is handsomely printed and bound, the arrangement for including plates being novel and good. Some large views given are not strictly necessary, but are pleasant to look at. A little smaller type and less margin would have made the book more convenient, perhaps, for the class for whom it is intended.

The work seems to be intended rather for topographers engaged in geodetic work on a large scale than for the humdrum and minute detail of topographical work for railroad surveys, and hardly seems to have adequately treated the latter. Nevertheless, there is always more or less of such extended work to be done in railroad mapping, which is generally poorly done. This book will assist in showing how to do it quickly and well.

The notes as to "Polyconic Projection," for mapping large areas, need extension. The simplest method for areas less than 100 miles square is to plot the parallel of latitude by considering them as parabolas, although the method is laid down in no book that we know of. The art of taking precise contours quickly and easily is hardly alluded to. Topography without this for railroad work is a delusion and a snare. The art of plotting notes is very inadequately treated; in fact, it can hardly be said to be treated at all. There are but two methods worthy of approval: Plotting by bearings and by latitudes and departures; plotting by angles being almost invariably a mistake of judgment, we think. The use of latitudes and departures is only expedient when some mechanical or graphical device is used for computing the traverse. One such device, at least, is admirably quick and accurate, and should be described, but is not. Some explicit words of instruction about mapping quickly and well would have been more practically useful than almost anything else in the volume; but there is nothing whatever. As examples for practical use the illustration plates themselves are all bad in this: that they show all the contours of equal size, instead of having every fifth contour heavier, which should be an invariable rule in maps designed for use in projecting. Some good examples of actual railroad maps should by all means have been included, or at least one plate which would have shown the student how such work should actually look. Altogether the book is far from ideally perfect—which is apt to be the case with books—but it will serve a good and useful purpose in preparing the student to learn something about taking topography.

A New System of Laying Out Railway Turn-outs Instantly, by Inspection from Tables. By Jacob M. Clark. New York: D. Van Nostrand.

This little book affords the means of determining from tables without calculation the precise length of a turn-out from heel of switch to point of frog, to within one-tenth of a foot, and the precise radius and degree of the turn-out curve; but it is exceedingly technical in its form—so much so that to any one without training in mathematics even the tables will be unintelligible—and it violates established practice and custom by assuming that the frog is usually designated by its angle instead of by its number or proportion, and that the usual fixed condition in laying out a turn-out is the radius of the turn-out curve instead of the frog number. This greatly extends the tables and makes their use unnecessarily cumbersome even for the trained engineer. It is singular that the author should make no attempt whatever to facilitate laying out turn-outs directly from the number of the frog, either by giving a little subsidiary table or by indicating in a separate column the numbers of the frogs, and this defect alone we should regard as making the book ill-adapted for practical use in its present form, even if we regarded it as necessary to determine lengths of leads with such minute precision, which we do not. For the author's tables show us that with the sharpest frogs in use on ordinary railroads, say 1 to 5, and with a 10' main line curve, the error in the length of the lead resulting from paying no attention to the fact that the main track is curved is only three or four inches in length

of lead and 3 to 5 minutes in the frog angle. The latter is an utterly inappreciable error, far within the limit of error in manufacture. The error in lead is also of no importance, for we have only to consider the turn-out curve to be very slightly compounded and we shall find that theory alone, to say nothing of practice, will permit us to vary the length of lead by a considerable percentage without objectionable irregularity in the turn-out curve.

Certain trifling additions to the tables in the way of explanations of the symbols on the same page would have added to their convenience, and should by all means have been given; but the tables themselves are unsuited to a purely practical purpose like this, where we want exactly what is really necessary in practice and nothing more. Mathematical readers will at once perceive that the precise length of a lead is a matter of no moment, by remembering that any turn-out curve may be considered as a parabola instead of a circle without affecting its position on the ties by an appreciable fraction of an inch. In that case—as will be more easily seen by making a small sketch—the tangent to the curve starting from the frog-point, and fixed in direction by the frog-angle, may be of any given length and may remain fixed; but the tangent to the turn-out curve which is fixed by the main-line rail does not need to be of the same length, as with a circle, but may be either longer or shorter and yet give a good and mathematically correct curve. In fact, if the main-line tangent be made the longer it gives a better turn-out curve than if it were a true circular arc.

From lack of attention to this simple mathematical truth arises much of the hair-splitting minuteness of many formulae.

TECHNICAL.

Safety Signals at Draw-Bridges.

In a short time the five draw-bridges on the New York Division of the New York, New Haven & Hartford road will be protected by the patent appliances for running trains to a side track in case an engineer fails to stop his train before an open draw-bridge. The railroad company provides the best railroad signals used in the country, but to guard against any possibility of carelessness an apparatus is to be provided at each bridge whereby absolute security will be assured. A device of the Union Signal Co. of Pittsburgh has been in use for several months with the best results at Westport. The cost of the apparatus is about \$5,000. Last week the Railroad Commissioners and officers of the Consolidated road visited Cos Cob bridge and inspected the workings of an appliance constructed by the Pennsylvania Steel Co. At the centre of the bridge has been placed a crank apparatus under the direction of the draw-tender. When the draw is to be opened the tender turns the crank partly around, and by so doing throws up a signal on each side 1,400 to 2,000 ft. from the bridge, warning the engineer to stop his train, and at the same time throwing up the home signal. Both of the signals are semaphores, the distant signal is green and the home signal red. The draw-tender then turns a lever half way round, and resumes his crank, one turn of which sets the derailing switch by drawing the bolt that holds the switch in position for the main line; the derailing switch guides the train into the sand bank, providing the engineer has neglected to stop his train by the aid of the road signals. The bridge-tender having performed these operations the crank is again turned, drawing the bolt holding the draw in position; and then the draw is in condition to be opened by the ordinary means. After the draw has been closed, and while the signals are still in position, one turn of the crank sets the switch for the main line, another manipulation drops the signals and another fastens the draw. The draw cannot be opened before the signals and the derailing switch are set, and the signals cannot be dropped until the draw is again securely fastened. Absolute safety is thus obtained. These manipulations are intended to prevent accident in case of neglect of an engineer, for under ordinary circumstances an engineer would obey the ordinary signals. No case of carelessness to show exactly what would happen in case of danger has occurred at the Westport draw; and such an instance might not occur in years. To insure absolute safety the company has decided to put up safety appliances at Cos Cob, South Norwalk, and at the Housatonic River, if the Railroad Commissioners approve of the new arrangement.—*Bridgeport (Conn.) Republican Standard*.

Block Signals on the Boston & Providence.

The Boston & Providence Co. has made a contract with the Union Switch & Signal Co. to put up block signals on its road from the Boston & Albany crossing in Boston to the junction with the Dedham Branch at Forest Hill, a distance of about five miles. In connection with the block signals the interlocking signals and switches of the Union Co. will be introduced on this section of road, and the various highway crossings will be carefully protected. The system is to be gradually extended over the whole of the road from Boston to Providence.

A New Automatic Cut-Off.

The Elmira (N. Y.) *Register* says: "Master-mechanic Bonney, of the Tioga Railroad repair shops, has constructed a miniature horizontal engine, of about four horse power, with a novel automatic cut-off attached to the eccentric. By this means the old fashioned governor is done away with. Mr. Bonney does not claim a patent on the invention, but merely considers it an experiment. It looks practical and may prove a valuable attachment to steam engines."

A Tube-Makers' Combination.

Engineering of March 7 describes a pool formed by manufacturers of boiler tubes and other steam pipes in this country, but hitherto kept secret, as follows: "The iron tube-makers of America have formed themselves into an association under the name of 'The Empire Iron Company, Limited.' The share capital of the company is proportional to the sum of the output of all works in the country, and each manufacturer holds shares in it in accordance with the extent of his plant. Now the capacity of the mills for furnishing boiler flues and steam pipes in the United States is much in excess of the demand at present; in fact, it is only in extremely good times that all of them can be worked to the best advantage. Consequently, without artificial restriction, each manufacturer would endeavor to obtain as many orders as he could execute by lowering his prices, and the result would be that none would make any profit, and much of the advantage that they might be expected to derive from these import duties would be lost. But under the present arrangement the same selling price is fixed for all, at a figure which will carry a profit. Each member sends copies of all his invoices to the company's offices, and pays in a certain pro-

portion of these amounts. Thus a fund is created, which is distributed as dividends on the shares, and each member receives an amount which depends upon the size of his plant.

"From a copy of the by-laws of the company we learn that whenever any stockholder shall desire to sell his stock he shall first offer it to the company, who shall have the option of taking it 'at any given price, or at any modification of such price, and before it shall be offered to any other party, and that the directors are authorized to make purchase of the stock under such circumstances.' Agents from the company are established at all the mills of the members, and their duty is to report all 'shipments of goods covered by contracts.' These agents are moved from place to place, never staying at one works more than eight weeks, in order that they may be less liable to influence. In other respects the individual firms seem to be at liberty to manage their affairs as they please."

We learn from other sources that this combination was made last December, when prices were so low as to be regarded as altogether unprofitable. The prices have fluctuated greatly. Four-inch boiler tubes have been as high (in 1878) as \$1.20 per foot with 5 per cent. discount, and as low (1883) as 50 cents per foot, with 60 per cent. and 5 per cent. off—that is, from \$1.14 down to 19 cents. The latter price, it is said, and may easily be believed, did not pay for the iron. Three-inch tubes have varied between 75 cents per foot with 5 per cent. off, and 35 cents, with 60 and 5 per cent. off; 2-in. tubes from 45 cents less 5 per cent. to 23 less 60 and 5 per cent. Of course the difference in the prices of iron in this time, much as it has varied, accounts for but a small part of the great variation in the prices of tubes. Immediately after the combination was made the price was advanced by making the trade discount 47½ instead of 60 and 5. It is reported, however, that a further slight advance will be made soon by reducing the discount to 45 per cent. With a higher price than this latter importations would be possible, the duty being 3 cents per pound.

American Society of Civil Engineers.

At the regular monthly meeting March 19 a paper was read by E. B. Dorsey, C. E., on "The Comparative Danger from Conflagrations in New York and London," commenting on the special advantages of London in respect to a constantly moist climate, smaller and lower buildings and less dense population, together with other advantages which are common to all European cities as against all American cities, viz.: a solid style of construction, more brick and stone and less wood, more and higher fire-walls, fire-proof roofs, and no wooden cornices. The point of special interest to railroad men and engineers, however, was the immense network of railroads inside the city limits of London and their solid and permanent style of construction, all of them being either elevated above or depressed below the surface (nearly all elevated), and when so elevated carried upon solid brick and stone or dirt embankments of great width, so that they are an effective barrier to fire and an important element, from their number, in the protection of the city.

Adding Lines to Blue-Prints.

Mr. T. O. Perkins, writer to the *Engineering News*, states that he has lately discovered that white lines and letters may be made on a finished "blue copy," by using, as one would use ink, a solution of chloride of lime in water, made by mixing the chloride with about an equal quantity of water, shaking it, and allowing it to stand a few hours before using. It is applied with a drawing or writing pen, and allowed to stand till dry. The sheet is then thoroughly washed in water, the blue color washing off wherever the solution has covered it and exposing the white surface of the paper. The solution is also useful for erasing lines or figures in carmine and in some writing inks.

The usual process for this purpose is a solution of caustic potash (about one stick) in four ounces of water. Used as an ink this leaves a white (or rather yellow) line without any washing afterward. The neat appearance of the tracing is injured, however, and the above process may be better for extensive changes.

Railroad Building in Chili.

The Valparaiso correspondent of the *San Francisco Bulletin* writes: "The Southern Railroad is to be continued to Angol, thence through the Arauco Indian country to Valdivia. Mr. Hillmann, an American, has received a large contract for building from the government. Orders have been sent to Europe for the purchase of 10,000 tons of railroad rails and iron for bridges. The locomotives, passenger and freight cars, have been ordered in large numbers from the United States, and six engines with 200 freight cars have arrived for the Santiago road. Demands have gone forward and are to go later on to California for heavy bridge timbers and planking."

"In Linicache the new passenger and freight depot of the railroad has been commenced. It will take two years to finish it. At Calera the government has ordered a wooden bridge to be built across the river which will be over half a mile long. Improvements are going on equally in nearly all parts of the country, and will stimulate the trade between this country and California, as the larger proportion of lumber used for building purposes is Oregon pine. The California nail manufacturers should look out for their interest in trade on this coast."

Peninsular Car Co.

Plans have been completed for the new shops of the Peninsular Car Co. in Detroit which are thus described by the *Detroit Post and Tribune*: "The shops will cover a large proportion of the 23 acres of land recently purchased at the Milwaukee Junction from Thomas W. Palmer, and the entire cost of construction will not exceed \$150,000. The works will be built of brick and will embrace an erecting shop, wood machine shop, brick shop, engine house, boiler house, wheel foundry, blacksmith shop, soft casting foundry and a number of offices, storehouses, etc. A system of tracks will connect all the shops."

"The dimensions of the erecting shop will be 162 ft. by 322 ft., and in it all cars will be finished and run out upon the track ready for service. The capacity of the erecting shop is placed at 72 cars."

"The wood-machine shop adjoining will be 352 ft. long and 142 ft. wide. A new system for placing the machinery will be introduced here, the shop to be provided with a basement wherein will be adjusted all shafting and belting necessary to run the machinery above. The chances for accidents will thus be reduced to a minimum, there being no belts in the working room to be feared and avoided. The flooring will be extra heavy on account of the great weight it will have to sustain."

"The truck shop, where the car frames will be placed upon the wheels, will be 90 by 50 ft. in size. The engine house will be 84 ft. in length by 22 ft. in width. The smoke-stack will be 125 ft. in height, the largest and highest in the city. The boiler-house, 40 by 50 ft., will contain six steel boilers. The blacksmith shop is perfect in arrangement, and will be extremely large, 363 feet long by 80 ft. wide."

"The wheel foundry, 112 ft. by 184, is to be the finest

arranged in the country. There will be an overhead system of carriers, so that the molders can easily move patterns and wheels. This will altogether dispense with the assistance of cranes. The dimensions of the soft casting-foundry will be 132 by 227 ft. The offices will be finished in hard wood after an expensive fashion, and the entire 23 acres will be cut up by a network of track intersecting in all directions.

"The shops are laid out on the plans so that the raw material will enter from the south side and leave the grounds at the north in the shape of a finished car, nothing being subjected to rehandling. The capacity of the entire works will be 40 cars per day. There will be over 4½ acres of slate and gravel roof besides 1,000,000 feet of shingle roof."

Car Building in Mexico.

The Mexican Central is trying the experiment of building its own freight cars, the framework being of oak from the company's forest at Nado, while the pine comes from the forests near Patzcuaro, in Michoacan, whence it is hauled to the Mexican National at Morelia and delivered to the Central at Celaya. This makes a haul by mules of some 50 miles, and by rail some 300 miles.

Railroads in Guatemala.

An exchange says: "The Huntington railway system in Guatemala and San Salvador will, when finished, aggregate over 600 miles of track, and will cost some \$8,000,000. The 3 ft. 6 in. gauge has been adopted. The principal cities of San Salvador and Guatemala will be in rail communication with each other as well as with either coast."

"According to recent reports regarding the Northern Railroad of Guatemala three parties of engineers have commenced the survey of this road, and the directors intend, when the first party, headed by Mr. S. Miller, the Chief Engineer, completes the survey of the section from the port of Santo Tomas to El Mico, a distance of 65 miles, to begin work at Santo Tomas and push the grading as rapidly as possible. General F. Millen has obtained the contract for all the work on the first division, and all the necessary implements have been ordered at New York and will be shipped to Santo Tomas."

A New Plan for Building Street Railroads.

The United States Cable Road & Subway Co., has been incorporated in New York to build street railroads on a plan patented by Nelson B. Adams and O. D. Orvis. This plan is thus described by one of the projectors: "The tracks will be laid in tunnels under the street, and the wheels running on them will be connected with the car above by a steel plate a half inch thick, which will pass along through a slot in the surface of the ground. Take Broadway for an example. If cars were introduced on that thoroughfare and ran on this system the street would have the same appearance generally that it bears now, and if you inspected closely you would see nothing but two parallel slots a ½ in. wide running parallel to each other. These slots would be too narrow for the foot of man or beast to be hurt by them, and except when a car was actually passing, it would have no effect on the traffic at any given point."

The company also propose to build an arch between the underground tracks, in which telegraph and electric lighting wires can be run, and thus solve the problem of the telegraph pole nuisance in large cities.

Novel Cure for Noisy Railroad Bridges.

The Osnabruck Steel Works have recently been manufacturing steel rails 88 ft. 6 in. long, which have been laid down on railroad bridges crossing the city of Hanover, Germany. It was found that the noise caused by passing trains was becoming such a nuisance that a remedy had become a necessity. The cause of it was the violent vibration at the rail joints, and the engineers hit upon the expedient of having the rails made long enough to cover the whole length of the bridges. Since they were laid down the nuisance caused by the rail joints has ceased. The use of rails of the length stated is, as far as we know, without a parallel in the history of railway construction, and reflects credit alike on the engineers who suggested it and the manufacturers who made them.—*Iron*.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Chicago & Alton, annual meeting, at the office in Chicago, April 7, at 10 a. m. Transfer books close March 15.

New York Central & Hudson River, annual meeting at the office in the Union Depot in Albany, N. Y., April 16, at noon.

New York, Susquehanna & Western, annual meeting, in Jersey City, N. J., May 1.

Dividends.

Dividends have been declared as follows:

Chicago, Rock Island & Pacific, 1½ per cent., quarterly, payable May 1. Transfer books close March 29.

Chicago, St. Paul, Minneapolis & Omaha, 1½ per cent., quarterly, on the preferred stock, payable April 21. Transfer books close March 31.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

General Time Convention, Spring meeting, at the Grand Hotel in Cincinnati, O., at 11 a. m., on Wednesday, April 9.

Southern Association of General Passenger and Ticket Agents, semi-annual meeting, in Charleston, S. C., on Wednesday, April 9.

Southern Time Convention, Spring meeting, at No. 46 Bond street, New York, at 11 a. m., on Wednesday, April 16.

Association of American Railroad Superintendents, semi-annual meeting, in New York city, on Monday, April 21.

American Society of Mechanical Engineers, Spring meeting, in Pittsburgh, Pa., on Tuesday, May 20.

Railway Car Accountants' Association, annual convention, in Richmond, Va., on Tuesday, May 20. Western members are requested to meet in Ashland, Ky., May 18; Southern members in Atlanta, Ga., May 17, and Eastern members in Washington, May 19, to proceed to Richmond together.

Master Car-Builders' Association, annual convention, in Saratoga, N. Y., beginning on Tuesday, June 10.

Master Mechanics' Association, annual convention, in Long Branch, N. J., beginning on Tuesday, June 17.

Railway Telegraph Superintendents' Association, annual convention, in Boston, on Tuesday, June 17.

General Baggage Agents' Association, semi-annual meeting, in Boston, on Wednesday, July 16.

Master Car-Painters' Association, annual convention, in Boston, on Wednesday, Sept. 3.

Road-Masters' Association of America, annual convention, in Indianapolis, Ind., on Wednesday, Sept. 10.
American Street Railway Association, annual convention, in New York, on Wednesday, Oct. 15.

Foreclosure Sales.

The **Burlington & Ohio River** road was sold at public auction in Carlinville, Ill., March 18, and was bought for \$14,700 by H. S. Hopkins, of St. Louis, one of the contractors of the road. The company held no finished road, but graded some 15 miles from Carlinville, Ill., and had secured the right of way for some distance further. The sale also included a considerable amount of timber and bridge material and some 300 tons of steel rails.

Trunk Line Conference.

A meeting was held in New York, March 26, at which the presidents of the Vanderbilt lines and representatives of the Pennsylvania and the Grand Trunk were present. The conference was private and nothing was done, although it is understood that the present condition of rates was discussed.

Southern Association of General Passenger & Ticket Agents.

The semi-annual meeting of this association will be held in Charleston, S. C., at the Charleston Hotel, Wednesday, April 9, at 11 o'clock a. m.

Representatives of all lines in the territory of the association (south of the Ohio and Potomac rivers and east of the Mississippi and West Louisiana, Arkansas and Texas) are earnestly requested to be present.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Mr. John W. Clark has been appointed Acting Master Car-Builder in place of L. Packard, resigned. Mr. Clark was foreman at the Mount Clare shops.

Bangor & Piscataquis.—At the annual meeting in Bangor, Me., March 19, the following directors were chosen: A. G. Wakefield, C. L. Marston, Thomas S. Moor, John Cassidy, Moses Giddings, W. B. Hayford, M. S. Drummond, A. M. Robinson, T. N. Egery, C. H. Sawyer, Isaac Strickland, Thomas White, Woodman C. Pitman. At a subsequent meeting of the directors Moses Giddings was re-elected President; H. W. Blood, Clerk; Arthur Brown, Superintendent.

Batesville & Brinkley.—At a special meeting held in Brinkley, Ark., recently, the following directors were chosen: Wm. Black, Brinkley, Ark.; James B. Dent, E. G. Thompson, Woodruff County, Ark.; James T. Henderson, Jackson County, Ark.; V. H. Henderson, White County, Ark.; R. W. Martin, Wm. J. Thompson, Little Rock, Ark. The board elected R. W. Martin President; Wm. J. Thompson, General Manager, Secretary and Treasurer; Elias Summerfield, Superintendent.

Canadian Pacific.—Mileage of cars of this company should be reported to R. H. Smith, Car Accountant, Montreal.
 Mileage of the company's cars in the Quebec, Ottawa and New England Air Line should be reported to B. D. Webber, New England Agent, at Boston.

Chesapeake & Ohio.—At the annual meeting in Richmond, Va., March 20, the following directors were chosen: John Echols, Williams C. Wickham, of Virginia; John Castres, Isaac E. Gates, A. S. Hatch, Elias Higgins, C. P. Huntington, A. A. Low, A. E. Orr, E. T. Tournier, Ezra Wheeler, New York. This is the old board.

Chicago, St. Louis & Pittsburgh.—The directors of this company as consolidated are: F. W. Betz, Wm. Borner, George Griggs, George Willard, Chicago; Wm. L. Scott, Erie, Pa.; John P. Green, George B. Roberts, R. Biddle Roberts, Philadelphia; Charles J. Osborne, New York.

Cincinnati, Van Wert & Michigan.—Mr. D. R. Ennis has been appointed General Superintendent. He was recently Superintendent of the Ohio Southern road, and has served on the Erie and the New Jersey Midland roads.

Dakota Midland.—Mr. Wm. H. Becker is President and General Manager of this company, with office at Ellendale, Dakota.

Danville, Olney & Ohio River.—Mr. C. E. Henderson has been appointed Receiver in place of Charles Howard, resigned.

Eureka Springs.—The board has elected R. C. Kerens, President; Powell Clayton, Vice-President and General Manager; Bernard Baer, Secretary; Logan H. Roots, Treasurer.

Globe Line.—Mr. S. T. McLaughlin has been appointed General Manager of this new fast freight line.

Grand Rapids & Indiana.—Mr. E. C. Leavenworth has been appointed Chief Clerk in the general freight office at Grand Rapids, Mich., in place of Mr. C. E. Gill, who has been made General Freight Agent.

Jeffersonville, Madison & Indianapolis.—This company has re-elected George B. Roberts, President; G. S. McKernan, Secretary and Treasurer. The road is leased to the Pennsylvania Company.

Kansas City, Fort Scott & Gulf.—At the annual meeting, March 12, the following directors were chosen: H. H. Hunnewell, S. Bartlett, Charles Merriam, F. Gordon Dexter, F. M. Weld, Francis Bartlett, N. Thayer, Alpheus Hardy, John A. Burnham, T. Jefferson Coolidge, B. P. McDonald, C. W. Blair, O. E. Larnard.

At the same time directors were elected for the leased and controlled lines as follows: **Fort Scott Equipment Co.**—Geo. H. Nettleton, L. W. Towne, J. S. Ford, Wallace Pratt, D. E. Jones, C. W. Blair, O. E. Larnard. **Fort Scott, Southeastern & Memphis**—George H. Nettleton, L. W. Towne, Wallace Pratt, Charles Merriam, J. S. Ford, W. J. Ferrey, C. W. Blair, O. E. Larnard, B. P. McDonald. **Kansas City, Springfield & Memphis**—H. H. Hunnewell, S. Bartlett, Charles Merriam, N. Thayer, T. Jefferson Coolidge, George H. Nettleton, J. Brumback, Wallace Pratt, L. W. Towne, J. S. Ford, J. H. Emmett, W. J. Ferrey, C. W. Blair. **Kansas & Missouri**—George H. Nettleton, Wallace Pratt, J. S. Ford, W. J. Ferrey, O. E. Larnard, C. W. Blair, B. P. McDonald. **Rich Hill**—George H. Nettleton, Wallace Pratt, L. W. Towne, W. J. Ferrey, J. S. Ford, Charles Merriam, C. W. Blair, B. P. McDonald, O. E. Larnard. **Short Creek & Joplin**—S. S. Bartlett, H. H. Hunnewell, F. M. Weld, F. G. Dexter, J. N. A. Griswold, Charles Merriam, F. Bartlett, N. Thayer, John A. Burnham, George H. Nettleton, B. P. McDonald, C. W. Blair, O. E. Larnard.

Lake Shore & Michigan Southern.—Mr. Nicholas Bartlett has been appointed Local Treasurer, with headquarters at Cleveland. Dwight C. Pardee has been appointed Assistant Treasurer, with headquarters at New York.

Missouri Pacific.—Mr. G. A. Haggerty has been appointed Master Mechanic of the New Orleans Division in place of

P. Stevens, resigned. Mr. Haggerty was recently on the Chesapeake, Ohio & Southwestern, and has served on several other roads.

Mr. W. E. Jones has been appointed General Claim Agent, in charge of settlement for damages by fire, stock killed and personal injuries. His jurisdiction is extended to cover and include the Wabash, St. Louis & Pacific Railway.

Monson.—At the annual meeting, March 20, the following directors were chosen: A. W. Chapin, G. F. Jackson, W. H. Pullen, J. F. Sprague, Monson, Me.; H. A. Whiting, Nashua, N. H.; George S. Cushing, G. A. Matthews, Lowell, Mass. The board elected H. A. Whiting, President; J. F. Kimball, Vice-President; George S. Cushing, Treasurer and General Manager.

New York, Woodhaven & Rockaway.—At the annual meeting at Far Rockaway, N. Y., March 25, the following directors were elected: James M. Oakley, A. P. Hatch, John B. Thompson, Martin Freligh, D. D. Conover, Julius F. Chesebrough, D. C. Fisk, A. M. Kidder, William D. Hatch, Edward St. John, William A. Tompkins, E. P. Alling, C. B. Orcutt.

Northern Pacific.—Mr. Charles B. Wright, of Philadelphia, has been chosen a director in place of Henry Villard, resigned. Mr. Wright was formerly a director and President of the company.

Ohio & Mississippi.—At a meeting of the board in Cincinnati, March 22, Capt. W. W. Peabody, for a number of years General Manager of the road was chosen President also in place of W. T. McClintock, resigned. He will continue to act as General Manager as well as President. The other officers elected were: C. A. Beecher, General Counsel; W. M. Walton, Secretary; A. D. Donaldson, Assistant Secretary; C. S. Cove, Treasurer, and Robert Garrett, James Sloan, and J. W. Tracey, Executive Committee.

Pennsylvania.—At the annual election in Philadelphia, March 25, the old directors were re-elected, as follows: Alexander Biddle, A. J. Cassatt, D. B. Cummins, Wm. L. Elkins, Alexander M. Fox, H. H. Houston, Wistar Morris, Henry M. Phillips, George B. Roberts, N. Parker Shortridge, Wm. Thaw, Henry D. Welsh, John Price Wetherill. There were 604,919 shares represented, all of which were voted for these directors, except 291 which were voted for E. T. Parker.

The board met March 26 and re-elected George B. Roberts President; Edmund Smith, First Vice-President; Frank Thomson, Second Vice-President; J. N. DuBarry, Third Vice-President; John P. Green, Fourth Vice-President; John C. Sims, Jr., Secretary; John D. Taylor, Treasurer.

Peoria, Decatur & Evansville.—The new board has re-elected C. R. Cummings President; George L. Bradbury, Vice-President and General Manager; R. A. Bunker, Treasurer.

Portland & Ogdensburg.—The Court has appointed Samuel G. Anderson Receiver of this road. Mr. Anderson is President of the company.

Richmond & Allegheny.—The following circular from the receiver is dated Richmond, Va., March 5:

"Mr. H. D. Whitcomb has been appointed Chief Engineer of this railroad, his appointment to take effect March 15, 1884. He will direct all works of railroad construction for the receivers, and have co-ordinate charge, with the Engineer of Water Power, in such matters pertaining to the water power as may affect the railroad or the cost of its maintenance.

"The Master Carpenter and road-masters, and employees under them, will observe and carry out his instructions pertaining to any matters under their charge, and will ask for his instructions in cases of difficulty or extraordinary repairs. Conductors of trains, and employees on the line generally, will observe any special instructions given by him."

St. Louis, Hannibal & Keokuk.—Receiver E. C. Case has issued the following circular, dated March 17: "Mr. W. W. Driggs is hereby appointed General Freight and Ticket Agent, with office at Hannibal, Mo. All communications relating to these departments will be addressed to him, and all instructions issued from his office will be respected accordingly. Under same date the office of Assistant Freight Agent will be abolished. Mr. B. J. Wilson will continue in the position of Train Master. Mr. W. H. Ide, having resigned his position as Auditor, to take effect March 15, Mr. Frank C. Cake is hereby appointed acting Auditor and Cashier, to take effect the same date."

Western Transit Co.—Mr. John L. Wilson has been chosen a director in place of John Allen, Jr., deceased.

Woodruff Sleeping & Parlor Coach Co.—At the annual meeting in Philadelphia, March 14, the following directors were chosen: James J. Donnell, Job H. Jackson, Wm. G. Johnston, Wilson McCandless, J. M. McClintock, E. Poulson, Charles I. Travelli, E. J. Unger, Henry Whelen. The board elected Job H. Jackson, President; Wm. G. Johnston, Vice-President; J. C. Paul, General Manager; Augustus Trump, Secretary and Treasurer.

PERSONAL.

—Mr. L. L. Packard has, it is said, resigned his position as Master Car-Builder of the Baltimore & Ohio road, after long service on the road.

—Mr. W. T. McClintock has resigned his position as President of the Ohio & Mississippi Railroad Co. He remains a director of the company.

—It is reported that Mr. John McLeod has tendered his resignation as General Superintendent of the Louisville, New Albany and Chicago road.

—Mr. L. A. Catlin, for a number of years Secretary of the Illinois Central Railroad Co., has resigned that position, and will retire from business altogether.

—Mr. Samuel Babcock has resigned his position as President of the Hartford & Connecticut Valley Co. He has been chosen President of the Middletown (Conn.) Savings Bank.

—Mr. C. S. Gleed, for a number of years connected with the Atchison, Topeka & Santa Fe road at Topeka, Kan., has become editor of the Denver (Col.) *Tribune*, and will have entire charge of that paper.

—Mr. Charles Howard has resigned his position as Receiver of the Danville, Olney & Ohio River road. It is understood that the bondholders' committee has withdrawn all expressions of dissatisfaction with Mr. Howard's management of the road.

—Mr. Abraham Klohs has resigned his position as Superintendent and Master Mechanic of the Ogdensburg & Lake Champlain road, to take effect June 1 next. His resignation is tendered on account of his advanced age. Mr. Klohs has served faithfully and with much credit on this road for a number of years.

—Mr. J. F. Barnard, General Superintendent of the Kansas City, St. Joseph & Council Bluffs road, had a narrow escape recently, two shots having been fired through a window of his private car, by two men who had evidently been waiting for it to pass. The men were not caught, and their motive for the attempt on Mr. Barnard's life is unknown.

—Mr. John Jay Cisco, who died in New York March 23, was born in that city in 1806. He was for many years in business as a merchant, being very successful in that pursuit. From 1852 to 1862 he served as Assistant Treasurer in charge of the United States sub-treasury in New York, and in 1864 he established himself in business as a banker, forming the house of John J. Cisco & Co., which is still in active business. As a banker Mr. Cisco had extensive dealings with railroad companies, placing large amounts of bonds for the Union Pacific, the Louisville & Nashville, the Houston & Texas Central and other roads, and acting as financial agent for a number of companies. Mr. Cisco was the first Treasurer of the Union Pacific Co., and was for a number of years a director of the Houston & Texas Central. He was well known in railroad and business circles, and leaves a considerable fortune.

—Mr. E. P. Vining, notwithstanding the hard work which he has done for the Union Pacific and the Western Trunk Lines Association, has found some time to devote to the study of an abstruse subject. The Chicago *Inter-Ocean* says: "Mr. E. P. Vining, Commissioner of the Western Trunk Lines Association, will soon publish a volume, the object of which is to absolutely demonstrate the discovery of America in the fifth century by the Chinese. Such a book will be read with the greatest interest, for it will prove one of the most splendid achievements of American scholarship, while it will arouse the attention of all literary and scientific people. The *Current* of the present week devotes considerable space to a review of the manuscript volume. Mr. Vining has brought into direct use 250 books, has examined fully 500, and has found it necessary to familiarize himself with fifteen languages that he might make original translations. Among the tongues he conquered was the Chinese, an incidental matter, but a herculean task all the same."

—Mr. Henry C. Lord, who died in Cincinnati, March 23, was born at Amherst, Mass., in 1825. He graduated from Dartmouth College, of which his father was President for many years, and studied law in Boston, but removed to Cincinnati in 1847, and had ever since lived there. He was successful in the practice of law, and about 1857 was chosen President of the Indianapolis & Cincinnati Co., whose road then extended from Lawrenceburg to Indianapolis. Under his management an entrance to Cincinnati was secured over the Ohio & Mississippi. In 1863 he secured a majority of the stock of the old White-water Canal from Harrison to Cincinnati, and after great litigation, in which such eminent counsel as Wm. H. Everts and Rufus Choate were engaged, finally established the principle that the grant for transportation purposes included a railroad. He then built his road in the bed of the canal from a point near Lawrenceburg the present line, thereby securing an entry in the heart of the city at Plum street, such as no railroad company had ever secured into a city before, and this at a trifling expense. He next leased the Indianapolis & LaFayette road, consolidating it with the Indianapolis & Cincinnati. Subsequently he built the White-water Valley road from Valley Junction to Cambridge City, connecting there with the Pan Handle system. He next built the Cincinnati & Martinsville road. All except the White-water Valley road belong to the present Cincinnati, Indianapolis, St. Louis & Chicago Co. Mr. Lord was subsequently connected with the St. Louis, Alton & Terre Haute and the Terre Haute & Cincinnati, and in 1873 he planned and organized the Belt Railroad system of Indianapolis, and was President of the company. Since 1874 he has spent most of his time in literary pursuits. He wrote a great deal on capital and labor, and his views were always clear, lucid and ably expressed. During the strikes of 1877 his articles attracted great attention. Mr. Lord had a wide acquaintance among railroad men, and was highly esteemed. In 1878 he was elected to the Ohio State Senate and served one term, but, although he was always much interested in public affairs, he was not an active politician and never held any other office. He leaves a widow, one daughter and two sons, one of whom is a professor in the Ohio State University.

TRAFFIC AND EARNINGS.

Hoosac Tunnel Line.

The following circular from General Manager Wm. E. Everest, of this fast freight line, is dated Buffalo, N. Y., March 1:

"Below please find numbers and initials of cars in this line (both numbers inclusive):

Boston & Maine.....	H. T. L.	1 to	25
Eastern R. R.....	H. T. L.	501 to	525
Boston, Barre & Gardner.....	H. T. L.	601 to	620
Providence & Worcester.....	H. T. L.	701 to	730
Troy & Boston.....	H. T. L.	*801 to	*930
Troy & Boston.....	H. T. L.	931 to	955
Troy & Boston.....	H. T. L.	1001 to	1200
Fitchburg R. R. (refrigerators).....	H. T. L.	*1500 to	*1599
Fitchburg R. R. ".....	H. T. L.	*1600 to	*1780
Fitchburg R. R. ".....	H. T. L.	*2001 to	*2400
Fitchburg R. R. (flats).....	H. T. L.	2401 to	2450
Grand Trunk R'y (Great Western Div.).....	H. T. L.	2501 to	2657
Vermont & Massachusetts R. R.....	H. T. L.	3701 to	4500
Vermont & Massachusetts R. R.....	H. T. L.	4701 to	4850
Fitchburg R. R. (C. H. & W.).....	H. T. L.	*5601 to	*5700
Chicago, St. Louis & Western R. R.....	H. T. L.	8201 to	8500
Chicago, Milwaukee & St. Paul R. R.....	H. T. L.	27000 to	27049

"The mileage of all Hoosac Tunnel Line cars should be reported to owners direct, separate from their common or other line cars.

"Cars marked above with a * to be reported separate from other cars owned by same roads.

"The movement of these cars should be reported to C. W. Cushman, Manager the Railway Car Association, Buffalo, N. Y."

Cut Rate Tickets to Kansas City.

A dispatch from Cleveland, O., March 25, says: "It has been stated that Robinson, the Traveling Passenger Agent of the Alton road, sold a block of 1,000 tickets from Chicago to Kansas City at \$7.25 each to a Toledo scalper last December. The tickets purported to be issued by the Cleveland, Mount Vernon & Columbus road, and were dated Dec. 11, 1881, form 73, being dated two years back to evade the pool agreement. The tickets are good, of course, and the Cleveland cut in rates would not have been discovered but for the recent theft of coupon tickets of the Mount Vernon road in Columbus. Receiver Walker, of the Cleveland, Mount Vernon & Columbus, says in reference to the above statement: 'These tickets were not stolen by Bentley, the clerk, who recently absconded from the office of the General Passenger Agent of the Cleveland, Mount Vernon & Delaware road, nor do the books of the Receiver show any record of the sale of the tickets referred to. It was a sur-

repetitious issue, made without the knowledge or sanction of myself or of General Superintendent Monsarrat, and the responsibility for which we are now engaged in locating."

Railroad Earnings.

Earnings for various periods are reported as follows:

Two months ending Feb. 29:				
	1884.	1883.	Inc. or Dec.	P. c.
Ala. Gt. Southern	\$169,181	\$107,046	I.	\$2,135
Central Pacific	2,067,000	3,213,633	D.	246,633
Cin., Ind., St. L. & Chi.	304,033	332,038	D.	28,005
Cin., N. O. & T. P.	342,581	339,847	I.	2,734
Des M. & Ft. D.	53,699	41,592	I.	12,107
Eastern	521,370	518,464	I.	2,906
E. Ten., Va. & G.	630,270	635,763	D.	5,493
N. O. & Nor'west	74,538	8,985	I.	65,553
Norfolk & West.	438,377	391,832	I.	46,545
Net earnings	171,380	152,883	I.	18,497
Northern Cent.	808,458	986,117	D.	177,659
Net earnings	259,467	287,931	D.	31,464
Vicksburg & Mer.	86,239	90,296	D.	10,057
Vicks., Shreve, & Pacific	30,212	21,617	I.	8,595

Month of January:				
	1884.	1883.	Inc. or Dec.	P. c.
Ches. & Ohio	\$280,621	\$251,970	I.	\$28,651
Net earnings	65,610	40,235	I.	25,375
Dan. & Norfolk	12,199	14,688	D.	2,489
Eliz., Lex. & B. S.	47,388	47,893	D.	505
Net earnings	3,506	1,985	I.	1,521
Minn. & St. L.	133,478	83,459	I.	49,969
N. Y., L. Erie, & W.	1,567,211	1,524,869	I.	42,342
Net earnings	85,777	304,577	D.	218,804
Oregon & Cal.	75,494	82,400	D.	6,906

Month of February:				
	1884.	1883.	Inc. or Dec.	P. c.
Ala. Gt. Southern	\$85,057	\$82,451	I.	\$2,606
Central Pacific	1,384,000	1,465,952	D.	81,952
Cin., Ind., St. L. & Chi.	112,251	156,956	D.	44,705
Cin., N. O. & T. P.	160,317	154,127	I.	6,190
Des M. & Ft. D.	27,215	21,573	I.	5,642
Eastern	277,913	271,430	I.	6,483
E. Ten., Va. & G.	320,391	312,522	I.	7,869
Net earnings	114,795	90,343	I.	24,452
N. O. & Nor'west	38,738	5,301	I.	33,437
Norfolk & West.	225,357	191,545	I.	33,812
Net earnings	88,008	74,969	I.	13,009
Northern Cent.	398,613	486,865	D.	88,252
Net earnings	119,676	129,712	D.	10,036
Vicksburg & Mer.	42,804	44,211	D.	2,107
Vicks., Shreve, & Pacific	14,757	9,633	I.	5,124

Second week in March:				
	1884.	1883.	Inc. or Dec.	P. c.
Bur., C. R. & No.	\$51,591	\$57,509	D.	\$5,918
Chi. & East. Ill.	27,139	31,128	D.	3,989
Chi. & W. Mich.	28,457	30,758	D.	2,301
Ches. & Ohio	71,515	63,340	I.	7,975
Det., Lan. & No.	23,038	30,388	D.	7,350
Eliz., Lex. & B. S.	12,778	12,219	I.	557
Florida Ry. & N.	19,570	16,793	I.	2,637
Peoria, Dec. & E.	16,996	14,375	I.	2,621

Third week in March:				
	1884.	1883.	Inc. or Dec.	P. c.
Canadian Pacific	\$62,000	\$66,000	D.	\$4,000
No. Pacific	200,000	146,600	I.	53,400
Roch. & Pitts.	17,858	6,111	I.	11,747
Chi., Mil. & St. P.	422,000	495,037	D.	73,037
Chi. & Northwest	407,300	475,000	D.	67,700
Chi., St. Paul, M. & Omaha	111,400	101,100	I.	10,300
Louisv. & Nash.	268,980	258,236	I.	10,744
Mil., L. S. & W.	25,470	17,130	I.	8,340
Chi. & Alton	167,223	166,928	I.	295
St. L. & San F.	94,500	80,200	I.	14,300

Weekly reports of earnings are generally estimated in part, and are subject to correction by later statements.

Grain Movement.

For the week ending March 15 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past eight years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1877	1,290,556	670,822	1,450,695
1878	2,728,322	1,830,874	4,041,054
1879	2,811,876	2,371,965	4,624,474
1880	4,302,860	3,694,550	4,737,406
1881	3,540,937	2,549,409	4,122,442
1882	1,928,778	2,234,242	1,116,052
1883	6,023,365	3,654,311	4,447,651
1884	4,902,106	3,359,514	2,047,942

Thus the receipts of the Northwestern markets for the week this year, though 1,121,000 bushels less than in the corresponding week of last year, were larger than in any previous year. They were also 196,000 bushels more than in the previous week of this year. The receipts were especially large at St. Louis—larger than for 51 weeks previously. The Peoria receipts were the smallest for four weeks.

The shipments of these markets were 295,000 bushels less than in the corresponding week of last year, and less also than in 1880, but larger than in any other year, 661,500 bushels more than in the previous week of this year, and the largest since lake navigation closed. In two days of this week the 20 cent rate was in force, and the large and sudden increase indicates that it, or irregular reductions made earlier in the week, had considerable effect. For five weeks previously the shipments had been nearly stationary. In the last week 319,543 bushels, or 9½ per cent. of the whole, went down the Mississippi.

The receipts of the Atlantic ports for the week were 82,400,000 bushels (58 per cent.) less than in the corresponding week of last year, and but about half as great as in any of the four years from 1878 to 1881, though nearly twice as great as in 1882. They were, however, 326,000 bushels more than in the previous week of this year, and with three exceptions were the largest this year. At New York the receipts were the largest since January.

The movement is now in corn chiefly, which formed 60 per cent. of the Northwestern receipts and 56 per cent. of the Atlantic receipts of this week to March 15. Wheat, of which alone there is a great stock in Western elevators, formed but 13½ per cent. of the Northwestern and 17½ per cent. of the Atlantic receipts. At St. Louis and the Western lake ports 21,857,000 bushels of wheat were in store March 15, and 11,625,000 bushels of corn. At the rate of the shipments of the last week, it would take 53 weeks to move all this wheat, but only 5½ weeks to move all the corn.

The exports of this week to March 15 from Atlantic ports five successive years have been:

	1880.	1881.	1882.	1883.	1884.
Flour, bbls.	95,831	174,133	147,582	117,495	148,068
Grain, bus.	4,296,276	4,372,276	1,500,227	3,374,348	1,561,846

The exports were a trifle greater than in 1882, but very much less than in any of the other years.

Cotton.

Cotton movement for the week ending March 21 is reported as follows in bales:

	1884.	1883.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	38,155	57,308	D.	19,153
Shipments	61,760	74,535	D.	12,775
Stock, March 21	160,809	279,946	D.	119,137
Seaports:				
Receipts	42,635	105,082	D.	62,427
Exports	75,236	191,863	D.	119,627
Stock, March 21	788,889	884,904	D.	96,015

The Commercial and Financial Chronicle gives the total movement for the cotton year (from Sept. 1) to March

31 at 5,291,282 bales, a decrease of 941,518 bales, or 15.1 per cent. from last year.

Petroleum.

The production of the Pennsylvania and New York oil fields for February is given as follows by Stowell's Petroleum Reporter, in barrels of 42 gallons:

	1884.	1883.	Inc. or Dec.	P. c.
Production	1,880,650	1,756,188	I.	124,462
Shipments	1,723,261	1,250,824	I.	472,437
Stock, Feb. 29	36,041,898	35,692,480	I.	349,418
Producing wells	20,630	17,270	I.	3,360

The production was exceeded in four months of 1883 and in eleven months of 1882. Of the total output the Allegheny District in New York furnished 18.5 per cent.; the Bradford District in Pennsylvania 55.3; the Warren District 15.0 and the Lower District 11.2 per cent.

The shipments were exceeded in eight months of last year, in seven months of 1882, and in seven months of 1881.

The stock reported is all in the pipe lines. It was increased during the month by 157,389 barrels, which is the excess of production over the shipments for the month.

There was an increase during the month of 174 producing wells. There were 209 new wells completed, and 10 dry holes, or failures to reach oil are reported. At the close of the month there were 273 new wells in process of drilling, and 173 new rigs building.

Shipments for the month were as follows:

	Barrels.	Pr. ct. of total.
New York	565,460	32.8
Philadelphia	242,580	14.1
Baltimore	30,908	1.8
Boston	11,310	0.6
Cleveland	361,387	21.0
Pittsburgh	77,365	4.5
Down the Ohio	3,506	0.2
Local points	269,964	15.7
Refined at Creek refineries	160,781	9.3
Total	1,723,261	100.0

Of the shipments reported from the wells 447,041 barrels (26 per cent.) were by rail, and 1,276,220 barrels (74 per cent.) by pipe line.

Shipments of oil refined at Creek refineries (reduced to its equivalent in crude) were: New York, 50,905; Philadelphia, 618; Baltimore, 3,323; Boston, 54,100; local points, 51,835; total, 160,781 barrels.

The Reporter says of the general condition of the market: "During the month of February there were no marked or unusual features to be found in the course of the petroleum trade. The attention of the trade during the month has been principally confined to the Balltown and Cooper districts, the latter embracing the new Henry's Mill district. The new wells in all of these fields, however, have not showed themselves in any wise different from those previously brought in. Commencing with quite a gush, they fail to hold up their first production for any length of time, dwindling rapidly to small producers of from 5 to 20 barrels. The new wells of the Henry's Mills tract are, indeed, showing somewhat better, the production of the 19 wells of the district being placed at 3,000 barrels, an average of 150 barrels per day. The indications of greater activity in operations will be found in the well account, which shows an increase of 174 producing wells, as against 150 last month. Further down we find that the average daily production of the new wells has risen from 13½ barrels to 16 barrels. * * *

"It will be seen that the increase in stock, which commenced last December, still continues, and that daily average is much increased over last month. Add to this the extensive developments in Europe, which only recently have been fully appreciated, and the influence which these must have on shipments, and the weight pressing down on the market is seen to be heavy indeed. It is true that production, on account of the poor staying qualities of the wells, which are now making the increase, may fall off again; but other influences which of late have been much stronger than the field news, however encouraging or discouraging, still prevail, and it does not seem probable that the trade can escape their influence soon."

Coal.

Coal tonnages for the week ending March 15 are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Anthracite	439,487	462,298	D.	22,811
Eastern bituminous	168,295	155,517	I.	12,778
Coke	53,797	50,161	I.	3,636

The spring price lists of the anthracite companies have generally been issued, showing nominally a small advance in prices. The question of further restriction of output is under consideration, it is said, but no agreement has been reached. At present the market is dull.

The coal tonnage of the Pennsylvania Railroad for the week ending March 15 was:

	Coal.	Coke.	Total.
Line of road	135,180	48,132	183,312
From other lines	57,401	5,665	63,066
Total	192,581	53,797	246,378

The total tonnage this year to March 15 was 2,531,283 tons, against 2,538,534 tons to the corresponding date in 1883, a decrease of 5,251 tons, or 0.2 per cent.

Cumberland coal shipments for the week ending March 22 were 49,022 tons. The total shipments this year to March 22 were 398,849 tons, against 403,051 tons to the corresponding date last year, an increase of 9,702 tons, or 2.4 per cent.

Immigrant Freight Rates.

By the rate-sheet, which took effect recently on the Northern Pacific and Eastern connections, great reductions are made on emigrants' movables. Previously the rate from Chicago to Bismarck was \$87, hereafter it will be \$70 per cent. From St. Paul the rate to Fargo was \$40; it is now \$35. The through rate from Chicago is \$65 instead of \$80. From Chicago to Carrington in the Devil's Lake country the rate was \$90 per car and is now \$70. These proportions in reductions are preserved to other points on the Northern Pacific.

Fort Worth Passenger Business.

The Fort Worth, (Texas), Gazette, says that Col. J. H. Britton, State Engineer of Texas, makes the statement that "more passengers got on and off the trains at Fort Worth in 24 hours than at Austin, San Antonio, Dallas, Houston and Galveston combined."

Northwestern Traffic Association.

A dispatch from Chicago, March 21, says: "The general managers of the northwestern roads met to-day and signed the pooling agreement entered into Wednesday. It was decided to continue the name of the Northwestern Traffic Association for the new pool. George L. Carman was elected Commissioner, and George M. Bogue Arbitrator. The percentages are to be fixed by Arbitrator Bogue, and the various roads are preparing arguments as to the amount of business they are capable of handling. The pool will go into effect April 1, but Arbitrator Bogue may not be ready by that time to announce his award. In any case, the per-

centages will date back to April 1. The general freight agents met this afternoon and agreed upon a schedule of rates to go into effect April 1. The general managers and general freight agents will meet again next Friday, to make arrangements in regard to the percentages and dispose of other unfinished business."

Coal Rates in Illinois.

Complaints against the St. Louis, Alton & Terre Haute company have been filed with the Illinois Railroad Commissioners by a number of coal miners in and about Belleville, charging unjust discrimination. The basis of the complaint is that the company has been hauling coal from White Oak to East St. Louis, a distance of 39 miles, charging the same rate that it did to haul coal from 10 to 18 miles. Complainants also say that they have information showing that the road has for a long time been hauling coal from 40 to 50 miles at 1½ cents per bushel, which is only one-half the rate charged for like service for a haul of 18 miles, and in consequence of the pooling agreement between the various railroad companies running into East St. Louis the company has failed to correct these abuses, and this action of the road is seriously injuring their business. Complainants also represent that the maximum rates fixed by the Railroad Commission are too high, and say that if any of the roads hauling coal to East St. Louis are willing to carry it 40 miles and more for 1½ cents per bushel no company should be permitted to carry it at 2½ cents per bushel for a shorter distance. A hearing will be given to the complaint shortly.

Union Pacific and Burlington Settlement.

The conference in Boston last week between the committees of the Union Pacific and the Chicago, Burlington & Quincy resulted in an understanding that harmony should prevail in the relations of the two companies on the business to Nebraska points. An adjournment was taken until the present week, when the committee will hold another meeting, at which it is expected that a definite form will be given to the agreement, although it will probably take some time to arrange all its details.

Southern Railway & Steamship Association.

The Rate Committee met in Atlanta, March 19, and continued for three days. The time was principally occupied in the discussion of the existing troubles, both south and north of the Ohio. A motion was finally adopted making the rate between New York and Atlanta 50 cents per 100 lbs. for first-class; rates to other points were adjusted on the same basis.

A meeting of the Executive Committee was called, to be held in New York March 27, to consider the present condition of business and the demoralization of rates, and also to consider questions submitted from the Rate Committee. The Rate Committee will hold another meeting immediately after the adjournment of the Executive Committee.

The resolution passed by the Rate Committee at the meeting is as follows:

"Resolved, That rates from New York, Boston and Philadelphia to Augusta, Atlanta, Rome, Macon, Athens, Dalton, Gainesville, Elberton, Washington, Milledgeville and Columbia be made as follows, taking effect Monday, March 24, 1884:

	1	2	3	4	5	6	A	B	C	D	E	F	G	H
	50	45	40	35	30	25	18	22	17	17	25	34	70	30

"Rates to Montgomery, Selma and Chattanooga to be named by General Commissioner."

"The above rates to remain in force until Chattanooga, Birmingham, Selma, Montgomery and Nashville rates are maintained on basis of at least 85 cents first class for Chattanooga."

"Rates from Baltimore to be less than New York, etc., on first three classes, 5 cents, all other classes 2 cents."

"Rates from Richmond, Norfolk and group to be less than Baltimore, 5 cents on first three classes and 3 cents all other classes."

"Rates from Charleston, Savannah and group to be less than Richmond, on first three classes 5 cents, all other classes 3 cents."

"When rates to Chattanooga and other points mentioned are made and maintained on basis of at least 85 cents for first class the General Commissioner is hereby authorized to enforce at once rates to Augusta, Atlanta, and other association points on the basis fixed for eastern rates at the 23d session of Rate Committee, and on western rates on basis fixed at 23d session of Rate Committee, with such amendments as may have been agreed upon by the Rate Committee since the adoption of the basis of the 23d and 23d sessions. The General Commissioner is requested to call a meeting of the Rate Committee at the earliest practicable day after restoration to Chattanooga rates is an accomplished fact. Rates from the western points to Atlanta, Augusta, etc., to be adjusted on the usual basis."

On March 22, however, General Commissioner Powers issued the following circular to all members of the association:

"Have just received telegram from Albert Fink, Commissioner trunk lines, that it has been agreed by all parties to restore rates on Monday morning, 24th instant, to same figures before the break, to all Southern points. This is therefore to notify you that rates of March 3, association circular letter No. 33, to Chattanooga, Montgomery, Selma, or Atlanta and all other points named therein, must be strictly maintained and enforced by all lines."

Globe Line.

The Globe (fast freight) Line has been organized to do business between New York and Chicago. It will work over the New York, West Shore & Buffalo, the Buffalo, New York & Philadelphia, the Pittsburgh, Cleveland, Toledo, and the Baltimore & Ohio roads. It will also reach Boston by the Boston, Hoosac Tunnel & Western and the Fitchburg roads. The new line will begin business as soon as the necessary arrangements can be completed.

Rates.

Notice has been given of the usual half-yearly change in lumber rates from the West to the seaboard, April 1, when the basis will be 30 cents per 100 lbs. from Chicago to New York, a reduction of 5 cents. Staves, stove-poles, heading shooks, hoops and hoop-poles take a rate 5 cents lower.

There was another reduction in east-bound rates last Friday, the 21st, to the basis of 15 cents per 100 lbs. from Chicago to New York for grain and flour (eighth class), with the usual differences for provisions. This is the lowest rate ever made regularly. It was given on the demand of President Roberts, according to the rules of the Joint Executive Committee that when there has been cutting there may be an immediate general reduction to the level of the lowest cut rate.

tiff's land, by reason of a negligently constructed dam, the defendant is not responsible for any extraordinary overflow caused by heavy rains, when his dam is ordinarily sufficient. 2. The measure of damages is not the difference between value of the land before and after the overflow; only the actual damage can be recovered. 3. When special damages are alleged in the petition only those can be recovered. 4. The injury to plaintiff's health, if alleged, is a proper matter for consideration in assessing damages.

Iowa Railroad Law.

A dispatch from Des Moines, Ia., March 26, says: The Senate this afternoon unanimously passed the House bill increasing the powers of the Railroad Commission. It is in substance as follows: The courts shall have jurisdiction to enforce by proper decrees, injunctions, and orders, the rulings, orders, and regulations affecting public rights made by the Railroad Commissioners for the future direction and observance of railroads in this state. The proceedings, therefore, shall be in the name of the state, and shall be instituted by the Attorney-General whenever advised by the board that any railroad corporation operating a road in this state is violating or refusing to comply with any rule, order, or regulation made by such Board of Railroad Commissioners, applicable to such railroad. It shall be the duty of the court to require the issues to be made up at the first term to which the cause is brought, which shall be the trial term, and to give the same precedence over other civil business. If the court shall find that such rule, regulation, or order is reasonable, just, and, in refusing compliance therewith, said railroad company is failing in the performance of any public duty, the court shall decree an injunction compelling obedience to such rule, order, or regulation by said railroad company, its officers, agents, servants and employees, and may grant other relief. All violations shall render the company's officers, agents, servants and employees guilty of contempt, and the court may punish such contempt by fine, and may imprison the person guilty of contempt. Such decree shall continue until the rule, order or regulation shall be modified or vacated by the Board of Railroad Commissioners.

OLD AND NEW ROADS.

Addison & Northern Pennsylvania.—This company is getting out lumber for bridges, trestles and making other preparations to resume work on the extension of the road into Potter County, Pa. A force will be put on the grading of this extension as soon as the weather permits.

Asheville & Spartanburg.—It is reported that this company is to be consolidated with the Western North Carolina, and that the connection with that line at Asheville will be completed at once. The road, which is now controlled by the Richmond & West Point Terminal Co., extends from Spartanburg, S. C., to Hendersonville, N. C., 49 miles, and the extension from Hendersonville to Asheville, 20 miles, was graded some time ago.

Baltimore & Ohio.—In Philadelphia, March 21, the City Solicitor filed a bill in equity to restrain this company from building its line into the city of Philadelphia on the route proposed. The bill charges that the Schuylkill East Side Co., under whose charter the proposed line is to be built, has no authority to occupy a public street without permission from the City Council, and that such permission has been refused. It also charges that the proposed crossing at Gray's Ferry will be a dangerous nuisance and an obstruction to travel.

Boston & Lowell.—The Boston Traveller of March 25 says: "An opinion has just been rendered by Judge Nelson of the United States Circuit Court in the case of the Nashua & Lowell Co. et al. vs. the Boston & Lowell Co. et al. The bill sets forth in substance, that for the term of 20 years from and after Oct. 1, 1858, the Nashua & Lowell Railroad and Boston & Lowell Railroad were operated jointly under a pooling contract, by the terms of which both roads were to be placed under the control and management of a joint agent to be appointed by the directors of the two corporations, and the joint earnings and expenses were to be shared in the proportion of 31 per cent. of the whole to the plaintiff and 69 per cent. to the defendant corporation, the division to be made on the first days of April and October in each year; that the defendant Hordford was appointed, and acted as the joint agent under the contract from April, 1875, until the expiration of the contract; that the defendant Bartlett was also the Treasurer of the defendant corporation, was appointed and acted as cashier of the joint funds; that Hordford, while agent, had, in violation of the contract and without authority, paid over to the defendant corporation from the joint earnings large sums of money, amounting as alleged to \$208,086, being 31 per cent. of the interest reckoned at 7 per cent. a year, from 1872 to 1878, on the entire outlay of the defendant corporation in the erection of new passenger stations in Boston and Winchester, in building the Mystic River Branch, and in purchasing certain shares of the Salem & Lowell and Lowell & Lawrence railroads (after deducting dividends on the shares), the whole of which expenditure was by the terms of the contract to be borne solely by the defendant corporation; that Bartlett, at the termination of the contract in 1878, had in his possession, as cashier, the sum of \$60,000 of the joint funds, the 31 per cent. of which belonged, under the contract, to the plaintiffs; and that acting under the direction of the defendant corporation, he had refused to pay the plaintiffs their share thereof, but had either retained such share in his own hands or had paid it over to the defendant corporation.

"The Boston & Lowell Railroad Co. and Bartlett have demurred to the bill, assigning various grounds of demurrer.

"By the familiar rules governing courts of equity, the plaintiffs are clearly entitled to equitable relief upon the case stated in the bill.

"The joint earnings of the roads constituted a trust fund in the hands of the joint agent, to be held by him as a trustee for the benefit of the two corporations, and to be applied by him in the manner specified in the contract. A failure on his part to perform this duty rendered him liable to account to the party aggrieved. If, through the mistaken or wrongful act of the agent, the Boston & Lowell road has received a larger share of the net earnings than belonged to it under the contract, the plaintiff is at liberty to follow the fund into the hands of the defendant corporation and compel its restitution. If, as the defendants argue, the pooling contract was not within the corporate powers of the parties to it, that can afford no defense to the Boston & Lowell road when called upon to restore to the plaintiffs the sums received in excess of its due share.

"As the contract has been fully executed and the defendant road has availed itself of all the benefits to be derived from it, that corporation is now estopped to deny its validity. Still less can the agents of the parties set up a defense of this character which is not open to their principals.

"The bill prays that the defendant corporation may answer by its President, J. G. Abbot. This must be

regarded as mere surplusage, and not as ground of demurrer. The plaintiffs are entitled to the answer of the corporation, but have no right to require that it shall answer by its president. Demurrer overruled."

Cahaba Coal Mining Co.—This company has recently completed a railroad 9 miles in length from its mines at Cahaba, Ala., to the South & North Alabama road. The road has been solidly built and is intended to carry heavy trains.

California Railroad Taxation.—An extra session of the California Legislature began March 24. It was called by the Governor for the following purposes:

"To propose an amendment to the constitution of the state by which the Railroad Commission as now existing shall be abolished, and in lieu thereof a railroad commission, to be composed of three commissioners, shall be created.

"To enact all laws necessary for the assessment to and collection from all railroad corporations or companies doing business in this state of income taxes.

"To amend or repeal any or all existing laws relative to revenue, and to enact new laws relative to the same.

"To propose and submit to the people of the state of California an amendment to the constitution of the state to the end that all property belonging to railroad corporations may and shall be assessed by the State Board of Equalization in the same manner as property belonging to individuals is now assessed by local assessors; and that mortgages and deeds of trust, contracts or other obligations by which a debt is secured, covering the property of railroad corporations, shall, for the purpose of assessment and taxation, be deemed and treated as an interest in the property affected thereby.

"To enact laws providing that the property of railroad corporations or companies may and shall be sold for payment of delinquent taxes in the same manner as the property of private persons is sold under the same circumstances.

"To enact a law declaring that the people of the state of California have not authorized and do not ratify any compromise nor any judgment heretofore rendered by consent in any action or proceeding for the collection of revenue by which a less amount is or has been received or recovered than the sum due by law or claimed in the complaint in the action.

"To propose and submit to the people of the state of California an amendment to the constitution fixing a maximum rate of charges for the transportation of passengers and freight on all railroad lines in the state, and for that purpose to classify railroad lines according to length, gauge or income.

"To enact laws for the prevention of and punishment for discrimination and for the reform of abuses in railroad transportation."

Canada Southern.—The agents of this company, Messrs. Taylor, Carroll & Cox, of New York, have completed negotiations with a syndicate of bankers, who agree to take \$2,000,000 of the company's 5 per cent. second-mortgage bonds, and have also an option on \$2,500,000 more. These bonds are part of the issue of \$6,000,000, which was authorized under the contract with the Michigan Central, to pay for the second tracks and other improvements on the road. The company disposed of \$1,000,000 some time ago. The present sale has been made at a price of about 5 per cent. above the former one. The syndicate includes Messrs. Hallgarten & Co., Kuhn, Loeb & Co., L. Von Hoffman & Co., Speyer & Co. and Blake Brothers & Co.

Canadian Pacific.—The contract for the rock work on the Mountain Division of this road through the Kicking Horse Pass of the Rocky Mountains has been let to Brady & Hubbell, whose contract will amount to \$1,000,000. Other contracts for the grading of this division have been let amounting in the aggregate to about \$500,000 more.

Chesapeake & Ohio.—This company makes the following statement for January, the first month of the fiscal year:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings.....	\$280,671	\$251,970	I. \$28,701	11.4
Expenses.....	215,011	211,715	I. 3,296	1.6
Net earnings.....	\$65,660	\$40,255	I. \$25,405	62.9
P. c. of expenses.....	76.8	84.0	D. 7.2	....

The indications are that the gain in earnings must have been largely from local traffic, as the company's western line shows a decrease in gross earnings. The statement for that line, the Elizabethtown, Lexington & Big Sandy, is as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings.....	\$47,368	\$47,893	D. \$525	1.1
Expenses.....	43,882	45,908	D. 2,026	4.4
Net earnings.....	\$3,506	\$1,985	I. 1,521	76.2
Per cent. of exps.....	92.6	95.8	D. 3.2	....

The gain in net earnings on this line was entirely due to the reduction in working expenses.

Chicago & Alton.—In Chicago, March 25, the old suit of this company against Samuel J. Tilden, Louis H. Meyer, and Adrian Iselin was finally disposed of in a decree entered in the United States Circuit Court. The defendants are the survivors of six persons who were appointed trustees in January, 1860, under an agreement made between certain bondholders and creditors of the Chicago & Mississippi and the Chicago & Alton companies. The question was referred some time ago to ex-Judge James Emmott of New York, with the agreement that his report and findings were to be conclusive. His report, on which this final decree was based, finds that the trustees, more particularly Messrs. Tilden and Meyer, in the discharge of their duties rendered valuable services for which they were entitled to compensation. It further holds that the trustees were barred on account of the lapse of time from claiming compensation for services covered by the bonds entrusted to them. They were, however, entitled to \$4,089 each for countersigning and certifying bonds, and \$500 a year each from 1863 to 1875, inclusive, as trustees of the sinking fund mortgage, with interest on claims from January, 1876, together with a counsel fee of \$3,000 and \$1,200 for clerk hire, making a total of \$86,952. On this report a decree was entered finding that there is due Messrs. Tilden and Meyer \$86,952 for all their services and that no other amount is due them. They are to retain the \$27,756 now in their hands as part payment, and the company is to pay them the remainder within 10 days. The trustees are to deliver up to the company 17 first-mortgage bonds and 26 income bonds held by them, and all other papers and documents which may be in their possession, and are to declare in writing that all the sinking fund and income bonds and 17 first-mortgage bonds, and all coupons on the same have been canceled and the lien discharged. Lastly, the company is to give the trustees indemnifying bonds in the sum of \$20,000, to protect them against any claims of creditors which may arise under the agreements of 1860 and 1862.

Chicago & North Wisconsin.—The engineers of this road have completed surveys of a line from Savanna, Ill., up the east side of the Mississippi to East Dubuque. The

line does not run through Galena, but it is said that the company has made an arrangement to use the Chicago & Northwestern track into that town.

Chicago, St. Louis & Pittsburgh.—The Illinois company of this name at a meeting held last week voted to ratify the agreement of consolidation with the Indiana corporation of the same name. The necessary certificates have been filed and the consolidation is now complete. It is merely formal, as the two companies have same ownership, and separate organizations were necessary only in order to coincide with the laws of the two states.

Chicago, St. Paul, Minneapolis & Omaha.—A letter has been addressed by Messrs. W. K. Vanderbilt and Chauncey M. Depew, as a committee of the board of this company, to Messrs. David Dows, R. P. Flower and H. H. Porter, asking explanations as to the issue of certain shares of the company, for which, it is claimed, no consideration was received.

Mr. Porter replies, saying that he is willing that all acts of his while an officer of the company shall be fully investigated, but declining to answer the questions put by the committee, whose real object, he says, is to make some sensation which may affect the Rock Island election.

Cleveland, Columbus, Cincinnati & Indianapolis.—The resolution in relation to dividends passed at the recent annual meeting has been referred to a committee consisting of President Devereux, Vice-President Burke and Mr. Wm. K. Vanderbilt. This committee will consider what amount is equitably due to the stockholders for dividends in place of the net earnings of the road which have been used in improvements, and they will also consider in what way the dividends should be paid, whether cash, or in securities, or partly in each. The report of the committee will be submitted to the stockholders for action.

Cleveland, Youngstown & Pittsburgh.—In the suit of William T. Riggs to recover from this company the balance claimed on his contract for building the road, the New York Supreme Court has granted an injunction restraining the company from removing any of its property now in that State. A considerable amount of bonds and other assets are under attachment in this suit.

Danville, Olney & Ohio River.—The two committees known as the Ware and the Corbin committees, each representing part of the bondholders, held a conference last week and agreed to compromise their differences. As a first step all the sharp criticisms made by one side and the other have been withdrawn, and it was also understood that all reflections on the management of the receiver have been withdrawn, and that, in consideration of this indorsement of his course, he will resign. It is understood that the two committees will join their forces with the intention of securing a sale of the property as soon as possible. The compromise plan of reorganization is, that as soon as possible the road will be sold and a new company organized. This new company is to issue \$500,000 in first mortgage 6 per cent. bonds, the proceeds to be used in the payment of such outstanding liabilities as the Court determines to be liens upon the road and also to put the road in a proper condition and provide equipment. The present bondholders are to receive income bonds bearing 6 per cent. interest, non cumulative, to the amount of 75 per cent. of the face of the old bonds. These income bonds are to be secured by a second mortgage. For the remaining 25 per cent. of their bonds they will receive stock in the new company. The extension of the road to the Ohio River, according to the original plan, is left for future consideration, and its construction will, of course, depend upon the willingness of the owners of the road to put more money into the property.

Delaware, Lackawanna & Western.—It is stated that this company will this spring remove the present round-house and repair shops on the Morris & Essex Division from the ground which they now occupy in Hoboken, N. J., to a point further back from the river and will begin on the present site of the round-house the building of a new passenger station and freight-house, a much needed improvement, as the present passenger station is only a temporary shed and is very much too small for the business done there.

Eastern Extension.—A dispatch from Halifax, N. S., March 24, says: "The Nova Scotia Government to-day introduced a bill respecting the Eastern Extension and Pictou Branch railways. It confirms the provisional transfer of Jan. 19, and provides for a complete transfer on payment by the Dominion Government of the following: First, \$12,000,000, with interest from Oct. 1; second, the cost and charges of the new rolling stock, with interest; third, the expenses incurred in repairing the steamer 'Norwegian'; fourth, the value of the stores—the interest in all cases to be at the rate of 6½ per cent. It is rumored that the bill will meet with strong opposition on its second reading."

East Tennessee, Virginia & Georgia.—This company has begun work on a passenger station in Atlanta, Ga., which is to be a handsome building. The building will be 112 ft. long by 18 ft. wide, with a wing at each end 25 ft. wide. There will be a two-story tower in the middle. The structure will be a frame building in the Queen Anne style, painted a light olive green with red trimmings. At the north end will be baggage and express rooms, next the ladies' waiting-room adjoining this, the gentlemen's waiting-room, and in the centre will be the agents' and ticket office. Next will come the waiting room for the colored people, then the kitchen and dining saloon. Work will also soon be begun on a new freight station of sufficient size to accommodate the business at that point.

This company's statement for the month of February is as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings.....	\$320,301	\$312,522	I. \$7,779	2.4
Expenses.....	203,596	222,178	D. 18,582	7.5
Net earnings.....	\$116,705	\$90,344	I. \$26,361	27.1
Per cent. of expenses.....	64.2	71.1	D. 6.9	....

This shows a considerable reduction in working expenses this year.

Ellendale East & West.—This company has issued the following circular, dated Ellendale, Dak., March 14:

"A change in the corporate name being deemed advisable, in furtherance of the future progress of our company, it was decided by the stockholders, at a special meeting held today, to make such change, and on and after this date the corporate name of our company will be the Dakota Midland Railroad Co., by which name our company will hereafter be known."

Eureka Springs.—At a meeting of the directors in St. Louis, March 17, a report was presented showing that the gross earnings for last year on the 20 miles of road worked were \$88,249. The expenses were \$22,284, leaving for the net earnings \$65,965, enough to pay the interest on \$1,000,000 and leave a small surplus. The business of the road has been larger than was expected. The road is in good condition and a bridge over the White River 280 ft. long has been built. The President presented a report in favor of the extension of the road from Eureka Springs to Mason, in Boone County, Ark., a distance of 49 miles. A survey has

been made on this line and a very favorable route found with moderate grades, and the engineers estimate that its cost will be \$15,000 a mile. The extension passes through a very good country, some of it already well settled and will also reach a large body of hardwood lumber which is now without an outlet to market. It was resolved to begin work on the extension provided the money can be raised on the company's first mortgage bonds.

Fitchburg.—The Boston *Advertiser* of March 26 says: "The Fitchburg Railroad Co. has, it is authoritatively reported, about completed the negotiations for a large tract of land near Roberts Crossing, Waltham, where it proposes to erect car-houses and repair shops. The Watertown Branch track will, it is understood, also be extended from its present terminus at the main depot in Waltham to this point, and all the trains thereon be started there. The construction of a depot at the northern terminus of the foot bridge over the Charles River, so long contemplated, is also among the improvements proposed. The work of effecting the changes will, it is expected, be commenced during the coming summer."

Fort Worth, Brownwood & Rio Grande.—This company, which was recently organized in Texas, is trying to secure local subscriptions along the projected line from Fort Worth southwest to Brownwood, about 120 miles. A preliminary survey of the road has been begun.

Fort Worth & Paris.—It is proposed to build a railroad from Fort Worth, Tex., through Grape Vine and McKinney to Paris, a distance of about 120 miles. The object of this branch is to open up the country and to connect Fort Worth with the proposed extension of the St. Louis & San Francisco road.

Grand Trunk.—At a conference held with officers of the road in Quebec, March 21, the locomotive engineers agreed to accept a reduction in the wages amounting to 10 per cent. on those of the first class, 8 per cent. on the second class, and 6 per cent. on the third class, the reduction to continue in force for three months. The other trainmen were offered the same terms, but refused to accept them, and there is some talk of a strike.

Great Northern, of Canada.—This company has applied to the Canadian Parliament for a charter to build a railroad from Ottawa to Quebec. The road will be generally from 20 to 30 miles north of the North Shore road and will be 138 miles long, or some 44 miles shorter than the North Shore road. It is also proposed to build branches into Montreal and to connect with the Ontario & Quebec Railway at Perth.

Hartford & Connecticut Valley.—The Connecticut Senate has voted to pass the bill to abate the taxes of this road for 1879, 1880 and 1881, on condition that the company build an extension to Springfield. Arrangements to build this extension were made some time ago, but the plan was dropped when the road passed under the control of the New York, New Haven & Hartford Co., that corporation not being desirous of spending money to build a line to compete with its own road.

Iowa & Southern.—This company (formerly the Des Moines, Iowa & Southwestern) has agreed to make St. Joseph, Mo., the terminus of its projected line, provided the people of that city will subscribe \$45,000 in aid of its construction.

Jacksonville, Tampa & Key West.—At the request of General Manager G. W. Bentley we correct the statement in a recent issue that this road was of narrow gauge. It is of 5-ft. gauge, the Southern standard. There are now on the road four Baldwin locomotives, which are, of course, 5 ft. gauge. The road was opened for travel on March 6 to Palatka, Fla., 56 miles from Jacksonville. At Palatka connection is made with the Florida Southern road for all points on that line. Work is in progress on the extension from Palatka on the east side of the St. Johns River to Sanford, where connection will be made with the South Florida road. On the completion of this extension the through line from Jacksonville to Tampa will be finished. The mistaken statement that the line to Tampa was already completed arose from the similarity of the names of the Florida Southern and the South Florida roads causing confusion in a hastily written note.

Kentucky Central.—Is it now thought that the refusal of some of the stockholders outside of the syndicate to pay the proposed assessment will result in the payment of the debt by the stockholders who are included in the controlling syndicate. What action they will take after that is not known, but it is possible that after securing control of the debt they will demand the sale of the road.

Louisville, New Albany & Chicago.—This company has made an agreement with the Chicago & West Michigan for the exchange of traffic and the running of through passenger cars. Under this agreement a through train will be run between Indianapolis and Grand Rapids, Mich., and other points on the Chicago & West Michigan road. Through trains will be put in very shortly.

Maryland Central.—At the instance of this company a bill has been introduced into the Maryland Legislature to authorize the city of Baltimore to issue \$400,000 in bonds, in order to assist this road to build an extension from its present terminus on the outskirts of Baltimore into this city and to build a station. The proposed extension will run to a point near the Hillen station of the Western Maryland road.

Memphis & Little Rock.—In the United States Circuit Court in Little Rock, Ark., March 24, application was made by R. K. Dow, trustee and others for the appointment of a receiver, on the ground that no interest has been paid on the bonds since January, 1882. This default in interest is part of the attempt of the present owners of the stock to force the bondholders to accept a lower rate of interest.

Mexican Central.—The *Mexican Financier* of March 1 says: "The schedule for the running of through trains is in preparation, but it cannot be accurately determined until the action of the connecting railways at El Paso is known. It is likely, however, that the express trains will leave here at 8 o'clock in the evening and reach El Paso early in the morning of the third day. By this arrangement three nights and two days will be passed on the train between here and El Paso, and the time from here to New York will be something like seven days. The most interesting parts of the line will be traversed by daylight—namely, the rich valleys between Silao and Zacatecas, and the Laguna region in Coahuila and Durango, together with the southern half of the state of Chihuahua, which promises to develop into a great cattle country. The trains from the north will also leave El Paso at about the same time in the evening, so that the same country will be seen going both ways. The through express trains will make short stops, and only at the principal stations, with long waits three times a day for meals. Going north the morning meal will be taken at Silao, the mid-day meal at Aguascalientes,

and the evening meal at Calera, the end of the second division shortly beyond Zacatecas. On the second day it is likely that breakfast will be taken at Villa Lerdio, dinner at Jimenez, and supper in Chihuahua. Coming south the order of breakfast and supper stations will be reversed. The express trains will consist of one or more Pullman sleeping cars, according to demand, first and second-class coaches, and a car for baggage, mail and express. No third-class passengers will be carried on the express train, as so many cars would make the train too heavy. Only first-class tickets will entitle passengers to go in the Pullman cars. This arrangement of the through express trains will compel the Atchison, Topeka & Santa Fe to make a difference of 12 hours from present arrangements for connections at El Paso, where its trains now arrive in the morning and leave in the evening. But as the Mexican Central will be one of the most profitable connections of that line it will probably consent to the change, since it is highly important that the time-schedule of the Central should be as proposed. For the accommodation of the thickly populated country between here and Zacatecas, the present train leaving here in the morning will be continued, as at present, running as far as Calera. The profitable nature of the Central's passenger traffic is shown by the fact that these two trains, the one running north and the other south, between here and Silao, together average over 800 passengers a day, demonstrating that Mexicans are as disposed to patronize railways as are Americans. This accommodation train will give to tourists and others wishing to visit places along the line which the express train will pass by in the night the opportunity of conveniently doing so. For instance, Querétaro is one of the most interesting places on the Mexican Central, which hundreds will desire to visit both for its historical and picturesque interest. By taking this train the beautiful Querétaro cañada may also be seen.

"Trains will begin running from the handsome new trainshed to-morrow. Complaint is made that the building for waiting-rooms is altogether too small and ill-adapted for its purpose. The death of Mr. Guzman has caused the idea of a celebration of the formal opening of the line to be definitely abandoned and the road will be put in condition for business at the earliest possible moment. The directors will make an official tour of the line probably late in March or in early April."

President Nickerson states that the earnings of the road so far as it has been opened have been increasing very rapidly and that considerable reduction had been effected in the operating expenses. The main question in connection with the expenses at present is the cost of fuel, which has been very high on the line of this road. It has been supplied with coal on the Northern Division from the line of the Atchison, Topeka & Santa Fe, and this fuel has been hauled about 450 miles, making the price very high. The company is now prospecting for a supply which can be secured more cheaply. The item of fuel was one of the chief obstacles to be overcome. There were no snows to contend with, no frosts, and cost of maintaining the track was much less than in the United States. Mr. Nickerson does not think that the expenses can be reduced below 60 per cent. of the gross earnings for some time at least. The Mexican government has consented to the running of a mixed train on the through line pending the completion of the telegraph and other work necessary to be done before the road can be accepted. It will probably be opened for through business between El Paso and the City of Mexico somewhere about April 10. The amount of the Mexican subsidy collected has been \$2,354,032 to date.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of March 1:

The locomotive engineers on the Northern Division of the Mexican National are reported to have united to insist that protection be guaranteed them against indefinite imprisonment in cases where they run over persons who carelessly get in the way of the trains. In this part of the country these troubles are now subsiding, thanks to the determined attitude assumed by the railway companies in protecting their employes.

The Mexican Railway of the Central Table-Land is at work on its line between here and Tlalpam, which place the company claims that it will reach by the middle of April, and be in Cuernavaca in December. It has now about six kilometers of road-bed finished from its station in the outskirts of San Antonio Abad. It is proposed to build for the present to Puente de Ixtla, between which and Cuernavaca are over 30 sugar haciendas, the traffic from which and from Cuernavaca is calculated to give a profitable income. It is estimated that the cost of building the line from here to Puente de Ixtla will be \$1,500,000, and claimed that the annual net profits would amount to the same figure.

The following additional notes are from the *Financier* of March 8:

The Mexican National is replacing its wooden trestlework bridges on the Mountain Division between here and the summit at Salazar with strong and handsome iron structures.

We are glad to learn that the post-office authorities have applied to the Mexican Central management to have arrangements ready for the transportation of mails daily to and from the United States by way of El Paso as soon as trains begin running over the whole line. As the line will certainly be in complete operation with express trains running through within a month, we shall not have to stand the present tedious and unsatisfactory steamship mails for an unbearable period.

Midland North Carolina.—In Boston, March 21, the Supreme Court granted an order for the dissolution of the Midland Improvement & Construction Co. and appointed a receiver to wind up the affairs of that company and to dispose of its assets. The company was organized about four years ago to build the Midland North Carolina road from Goldsboro to Salisbury, and completed a short section, from Goldsboro to Smithfield, 22 miles. It also for a time leased the Atlantic & North Carolina road, but finally defaulted on that lease and lost control of the road. The company is now insolvent. The 22 miles of road which it owns in North Carolina is parallel and close to the North Carolina track and is of very little value.

New Brunswick.—This road, or at least the Northern Division from Grand Falls, N. B., to Edmondston, is still blocked with snow, the drifts in many places being over 12 ft. deep, and no trains have been run for nearly four weeks. Several attempts have been made to keep the road open, but the fall of snow has been so heavy that they have not succeeded. Last week an engine with a snow-plow was sent out to make another effort, but both jumped the track at a high bluff on the St. John River, and are now lying on the ice in the river. The fall of snow in New Brunswick has been extraordinarily heavy this year, especially in the latter part of the season, and on all its lines this company has had much trouble.

New Jersey Railroad Taxation.—The railroad committee of the New Jersey State Senate, to which was referred the tax bill passed by the Assembly, has reported a substitute which is very different in character from the original bill

Under this substitute the railroad companies of the state will pay a tax of 1 per cent. on all the property outside the road bed and franchises for city and county purposes, and a tax of one-half of 1 per cent. on the valuation of the road bed and franchises for state purposes, the tax to be collected by the state and the proportion belonging to the municipalities to be paid over to them. The clause in the Assembly bill forbidding railroad companies from acquiring any additional property unless they surrender any charter exemptions which they may have been stricken out, and the committee has also dropped the clause forbidding foreign corporations to operate any lines in the state until they had surrendered such contracts.

New York, Lake Erie & Western.—This company's statement for January and the four months of the fiscal year from Oct. 1 to Jan. 31 is as follows:

	January— 1884.	1883.	Four months— 1883-84.	1882-83.
Earnings.....	\$1,567,211	\$1,524,869	\$7,982,907	\$6,854,109
Expenses.....	1,481,438	1,230,292	6,124,345	4,707,256
Net earnings....	\$85,773	\$304,577	\$1,858,562	\$2,146,850

The above statement includes this year, as in previous months, 68 per cent. of the gross earnings of the leased New York, Pennsylvania & Ohio road, and all the working expenses of that road. The company also gives the following statement, which gives the earnings of the New York, Lake Erie & Western only, excluding all the earnings and expenses of the New York, Pennsylvania & Ohio:

	January— 1884.	1883.	Four months— 1883-84.	1882-83.
Earnings.....	\$1,272,331	\$1,524,869	\$6,494,806	\$6,854,109
Expenses.....	1,098,257	1,230,292	4,547,838	4,707,256
Net earnings....	\$174,074	\$304,577	\$1,947,058	\$2,146,850

This shows for the Erie lines for the four months a decrease of \$359,210, or 5.2 per cent., in gross earnings; a decrease of \$159,418, or 3.4 per cent., in expenses, and a resulting decrease in net earnings of \$199,792, or 9.3 per cent.

A suit is in progress at Scranton, Pa., affecting the title to a large tract of coal lands in the Lackawanna Valley owned by the Hillside Coal and Iron Company, which is a subordinate corporation of the Erie. The suit originates in the sale of the land for taxes some years ago, and is further complicated by several transfers made in 1883, in which Jay Gould appears as owner of the property. The tract constitutes a valuable part of the Erie coal property.

New York & Long Branch.—In Trenton, N. J., March 20, a hearing was had before the master in the suit of the Pennsylvania Railroad Co. to prevent the annulling of the agreement between the Pennsylvania, the New Jersey Central, and the New York & Long Branch companies. Mr. Little, President of the New Jersey Central, testified that the notice given to the Pennsylvania to withdraw its trains from the Long Branch road was not intended to be forcibly carried out. It was a formal notice and its object was to bring the matter before the courts. Mr. Little said that he had signed the agreement as President of the New York & Long Branch Co. on information that the New Jersey Central directors had approved it and that he had understood that that approval was given from the fear that Pennsylvania would build a parallel road. The rest of Mr. Little's testimony contained nothing especially new. Mr. A. J. Drexel, of Philadelphia was examined in relation to the mortgage of \$1,500,000, which was executed by the Long Branch Co. after the conclusion of the agreement with the Pennsylvania. He testified that the loan was placed by Drexel & Co., and that they were induced to take it by the execution of the agreement. The hearing was then adjourned until this week.

On March 24 Assistant Comptroller S. M. Williams, of the Philadelphia & Reading, was examined. His testimony is reported by the *Philadelphia Ledger* as follows:

"Mr. Williams submitted a statement from which he gave, in answer to questions by counsel, the following figures: For the 14 months ending May 31, 1883 (when the New Jersey Central was leased by the Reading) the Central Railroad contributed \$437,406.29 to the gross earnings of the New York & Long Branch Railroad, to be pooled under the supplementary agreement, and the Pennsylvania Railroad contributed \$157,050.12, a total of \$594,456.41.

A summary of the earnings of the Central Railroad and the Pennsylvania Railroad between the New York & Long Branch Railroad and competitive points gave a total of \$877,669.63, of which the Central Railroad contributed \$646,984.07 and the Pennsylvania \$230,685.56. Deducting from this the 70 per cent. for operating expenses, \$614,368.74, of which \$452,888.85 was to be paid by the Central and \$161,479.89 by the Pennsylvania, the net earnings are found to be \$263,300.89. Of this sum \$194,095.22 is credited to the Central Railroad and \$69,205.67 to the Pennsylvania—a loss to the former of \$188,946.10 and to the latter of \$61,948.03—making a total loss for the New York & Long Branch Railroad of \$245,264.13. This was shown to be a net gain to the Central of \$10,147.12 and to the Pennsylvania, \$7,899.58. The gross earnings of the New York & Long Branch Railroad were stated to be \$622,053.35, against which was charged \$526,150.39 operating expenses, leaving net earnings of \$95,902.99. Against this again there were claims to the amount of \$341,167.12, leaving the net loss as already given of \$245,264.13.

The results to each company after a settlement under the pooling contract were that while the earnings contributed by the Central Railroad of New Jersey were \$437,406.29 and by the Pennsylvania Railroad \$157,050.12, each would receive credit for half the total or \$297,228.21. This would involve the payment by the Central Railroad out of its gross earnings to the Pennsylvania of \$140,178.08, a loss of that amount to the former and a clear gain to the latter. Accounting for the gains noted, a balance of \$130,030.96 loss to the Central Railroad, and \$148,067.72 profit to the Pennsylvania Railroad, is found. The allowance for train service by the Central Railroad, \$116,851.33, being deducted, leaves a net loss of \$13,179.63 on a total of \$46,984.07 earnings contributed or 2 per cent. The \$51,953.41 allowed the Pennsylvania Railroad for train service, makes their net profit \$230,021.13 on \$230,785.56 contributed, or nearly 100 per cent. As an expert Mr. Williams considered that this agreement upon which the above calculations were based was impracticable in operation, and that for want of proper provision for a cash settlement it must work unfairly to one side or the other. He considered it decidedly unjust. In answer to questions as to the issue of the million and a half mortgage on the New York & Long Branch Railroad, Mr. Williams stated that \$1,400,000 were placed by a syndicate at 94 per cent., and netted the company \$1,316,000, which with \$19,392.56 accrued interest on the balance, made a total of \$1,335,392.56. Of this sum \$697,320.23 was expended in double-tracking and making other improvements to the road; \$53,166.66 went for the redemption of the bonds of the New York & Long Branch Extension Railroad, which was merged afterwards, and \$581,581.15 was paid to the Central Railroad of New Jersey in payment of advances made to the New York & Long Branch Railroad, leaving a balance of over \$800,000 in the treasury in addition to the \$100,000 still unused.

"The witness was then cross-examined by Judge Logan. He testified that the calculations he had submitted were based wholly upon the pooling contract. Aside from the pooling contract, Mr. Williams said that he was unable to say that the agreement with the Pennsylvania Railroad was impracticable or unjust. He was not advised of the fact that in their bill of equity the Pennsylvania Railroad Co. had not asked for the enforcementment of the pooling contract, but only of the operating contract.

"In a re-examination by Mr. Kaercher, the witness stated that, under the operating contract alone, the joint loss suffered in the New York & Long Branch Railroad was \$245,204.13, of which the Central Railroad Co. was to pay \$183,948.10 and the Pennsylvania \$61,315.03, these amounts being in proportion to the business contributed by each.

"In answer to a question as to whether, in case the agreement had not been made, the Central Railroad would not have charged the Pennsylvania an adequate sum for the use of the Long Branch road, the witness said he hardly thought the Pennsylvania Railroad Co. would have paid it, but would have had to build another road. He was of the opinion that as the two companies enjoy equal advantages the contract should have been for each to pay one half of the loss. The witness was then examined as to the way in which the rates were fixed. He said that the rates in this case were fixed with the intention that the road should be just self-sustaining, but that the companies failed in this."

New York & New England.—Under direction of the Receiver work has been resumed on the second track between Blackstone, Mass., and Willimantic, Conn. The distance between these two places is 50 miles, but from Willimantic to Cheewink, 7 miles, the track has been in use for several months, and at other points long sidings have been laid. The road-bed for the second track is nearly all completed and the laying of ties and rails is now in progress. The ballasting cannot be finished until the ground is free from frost. The completion of this section will give the road a double track from Boston to Newington, 122 miles, with the exception of the short gap between Willimantic and Vernon where there is a very heavy rock cut.

A joint resolution permitting this company to issue preferred stock and to use the balance of its second-mortgage bonds in payment of its floating debt has passed both houses of the Connecticut Legislature. The bill is substantially the same as that which was passed in Massachusetts, and provides that the preferred stock shall not be issued unless approved by the vote of the majority of the present stockholders.

New York, Norfolk & Charleston.—This company was organized some time ago to build a railroad from Norfolk, Va., through North and South Carolina to Charleston, following pretty closely the line of the coast. It was the revival of an old project which was started nearly 40 years ago and has come up again at different times. The company has been having surveys made in North Carolina for some time past, and it is now announced that the road will be built by an organization known as the Carolina Construction Co. This company has sublet contracts for grading and bridging to the American Contracting Co., New York, for the sum of \$3,101,000, in securities of the railroad company. The projected line is to run from Norfolk southward through Washington, N.C., Newberry and Wilmington to Charleston, about 381 miles. An extension beyond Charleston is also talked about. The project is not a very promising one, as, if built, the road will run for the most part through a poor country, and will have to stand pretty sharp competition from existing lines on a business which is hardly heavy enough to bear division. The road however is not built yet, and may not be for a good while to come.

New York, West Shore & Buffalo.—It is reported that a plan for financial reorganization will shortly be submitted to the creditors of this company. The proposition favored now is to issue \$25,000,000 bonds at 6 per cent., secured by a second mortgage and to fund three years' coupons of old bonds into the new. Enough of the new bonds will be reserved to retire the \$10,000,000 of income bonds issued to the North River Construction Co. and the remainder will be issued to provide equipment, etc. The terminal bonds authorized will probably be withheld from the market for a year. The scheme is said to be favored by a controlling interest in the road, but is opposed by some large bondholders.

Receiver Ashbel Green has given notice that the North River Construction Co. will go into liquidation, and that the books have been closed permanently.

Norfolk & Western.—This company makes the following statement for February and the two months ending Feb. 29:

	1884.	1883.	1884.	1883.
Earnings.....	\$225,357	\$191,345	\$438,377	\$391,832
Expenses.....	137,349	116,348	293,937	238,949
Net earnings.....	\$88,008	\$74,999	\$171,380	\$152,883
Per cent. of exps.....	61	61	61	61

For the two months this shows an increase of \$48,545, or 19 per cent., in gross earnings; an increase of \$28,048, or 12 per cent., in expenses, and a gain in net earnings of \$18,497, or 12 per cent. The earnings and expenses of the New River Division, 75 miles, are included this year, but not last, as that division was not opened until May 21, 1883.

Northern Central.—This company makes the following statement for February and the two months ending Feb. 29:

	1884.	1883.	1884.	1883.
Earnings.....	\$398,612	\$186,865	\$808,488	\$986,117
Working expenses.....	\$255,126	\$297,479	\$499,921	\$586,547
Extraordinary ex.....	23,811	59,724	52,070	117,832
Total expenses.....	\$278,937	\$357,153	\$551,991	\$704,379
Net earnings.....	\$119,675	\$129,712	\$256,467	\$281,738

This shows for the two months a decrease of \$177,659, or 18.0 per cent., in gross earnings; a decrease of \$80,433, or 13.9 per cent., in working expenses and of \$65,762, or 55.7 per cent., in extraordinary expenses, making a decrease of \$146,195, or 20.9 per cent., in total expenses; the result being a decrease in net earnings of \$31,464, or 10.9 per cent.

Northern Pacific.—A correspondent of the Chicago Tribune says: "The construction of that portion of the Northern Pacific Railroad known as the Cascade Branch—from Alinsworth, Wash. T., to tidewater at some point on the Puget Sound—of necessity contemplates the passage of the Cascade Mountains. For years the question of discovering the most practicable route across these great natural barriers has been the object of engineers, and a great number of parties been in the field. Four routes thus far have been found—the Skagit, which is far north; the Snoqualmie, some distance south; and the Natchez and the Stampede passes. Recently experienced engineers have carefully examined the comparative advantages and disadvantages of the Natchez and Stampede passes and instituted a comparison. The result of such labors may be briefly summed up as follows:

"From the crossing of the Columbia River to the nearest

tidewater the route through the Stampede Pass is 20 miles and 300 ft. longer than that by way of the Natchez Pass; and the estimate of the cost of the mountain work is for the former \$1,600,000 greater than involved in the latter. The length of the tunnels required is 18,800 ft. by the Stampede Pass, or 7,700 ft. longer than that by the Natchez Pass. The grade is 86 ft. per mile for 10 miles by the Stampede Pass.

"From the Columbia Crossing to tidewater, by the Natchez Pass, the route is 20 miles and 800 ft. nearer than by the Stampede route. The tunnel is 9,100 ft. in length, or 7,700 ft. shorter than by the Stampede Pass. Total cost of construction \$1,600,000 less. The grade is 116 ft. per mile for 10 miles by the Natchez route.

"In the single matter of grade the Stampede Pass has the advantage of the Natchez. Col. Smith, a very competent engineer, states, however, that the grade may be reduced to 100 ft. per mile, which would leave the Stampede an advantage of but 14 ft. in grade for 10 miles; while in every point to be considered the Natchez has great advantages. Even with 18 bridges on the Natchez River, which will be required to reduce the grade to 100 ft., the cost will be 30 per cent. less than if the road were to be built through the other route.

"The estimate of \$1,600,000 does not represent the actual difference in cost between the two routes. It refers only to the mountain work; and, when the approaches are considered the total in favor of the Natchez swells to fully \$3,000,000. The Stampede Pass requires 25 miles of the heaviest rock-work along the Yakima Cañon, many tunnels and 10-degree curves, while the Natchez River presents a road-bed comparatively free from rock-work and easy of grade."

Ohio Central.—The Keystone Bridge Co., which built the bridge across the Ohio River at Point Pleasant for this road, has held possession of the bridge on account of the failure of the company to pay for it. Recently Receiver Sharp, under order of the United States Court, tried to have a telegraph wire put across the bridge, but the bridge company refused to permit it. The court sent a United States Marshal, who took possession and put up the wire; but on the same night the bridge company cut the wire and barricaded both ends of the bridge. Under orders from the Court the Marshal will take further steps to enforce his authority.

The following is a copy of the decree made by Judge Jackson at Charleston, W. Va., in January last, and recently affirmed by him, as noted last week:

"In the District Court of the United States for the District of West Virginia, exercising Circuit Court powers, at Charleston, in the District of West Virginia, and in the Fourth Judicial Circuit, on Tuesday, Jan. 15, 1884, Nelson Robinson, et al., vs. the Ohio Central Railroad Co.; William F. Owens, et al., vs. the Ohio Central Railroad Co., et al., and the Central Trust Co. of New York, vs. the Ohio Central Railroad Co., et al., in equity.

"These causes came on again on the 15th day of January, 1884, to be heard together, and were argued by counsel; and this Court, being of opinion that it first acquired jurisdiction of the parties to the controversy, and legal possession of the property by the service of process, and the absolute seizure of the res, it follows as a consequence, that all of the acts of John E. Martin, Receiver, in connection with that portion of the mortgaged property, rights and franchises of the defendant, the Ohio Central Railroad Co., including its railroad and coal property, south of Corning and Buckingham, in the state of Ohio, are a nullity and void; and that the acts of Thomas R. Sharp, heretofore appointed Receiver by this Court, must be held to be legal and valid.

"It is therefore adjudged, ordered and decreed that the authority of Thomas R. Sharp, who was on the 20th day of November, 1883, by a decree of this court, rendered and entered herein, appointed Receiver of the property, rights and franchises of the defendant, the Ohio Central Railroad Co., within the District of West Virginia, including the bridge across the Ohio River, to low-water mark on the Ohio side of said river, be and the same is hereby extended as such Receiver over the entire mortgaged property, rights and franchises of the said defendant, the Ohio Central Railroad Co., including its railroad and coal property from low-water mark on the Ohio side of said river to Corning and Buckingham, in the state of Ohio, with all the rights, powers, privileges and duties conferred and imposed upon him by the said decree, rendered herein on the 20th day of November, 1883, in relation to that part of the property, rights and franchises of the said defendant company, in the district of West Virginia.

"And it is further ordered that Henry M. Mathews, Esq., be and is hereby appointed counsel and attorney for the Receiver in these causes.

"J. J. JACKSON, Judge."

The above is a copy from the records of the District Court of the United States for the District of West Virginia, at Charleston, and is published as the record of Judge Jackson's action in the case. His reasons for affirming jurisdiction over the whole of the River Division were noted last week.

Ontario & Quebec.—A dispatch from Toronto, Ont., March 24, says: "For some time the managers of the Ontario & Quebec Railway have been in consultation with other roads, including the New York Central and the Michigan Central, in reference to a route to Detroit River. As a result of this, it has been definitely decided to abandon the London Junction Railway and allow its charter to lapse. A new road will be built from a point at or near Woodstock to Detroit River. From Detroit running arrangements will be made with the Wabash Railway, and there will thus be formed another through route from Montreal and Toronto to Chicago and the West."

Oregon Pacific.—It is reported that work has been resumed on this road and that the same force is employed in the tunnels on its projected line and also on the wharves and other buildings at Yaquina Bay, Oregon. Some rails were recently shipped from San Francisco to that point.

Oregon Railway & Navigation Co.—The new loan of this company, to which reference has heretofore been made, will consist of debenture bonds bearing interest at the rate of 7 per cent. and having three years to run. The amount of the loan authorized is \$4,000,000, and of this amount \$3,000,000 are now offered for sale by Lee, Higginson & Co., of Boston, at par and accrued interest. It is stipulated that these debentures shall be protected by any mortgage which may be made on the company's property hereafter, and prior to their redemption. The proceeds of these bonds will be used to complete the Baker City Branch of the road, and to pay off the present floating debt.

Peterboro & Hillsboro.—A large part of the first mortgage bonds are now held by the Northern (New Hampshire) Railroad Co., a considerable amount having been recently purchased from other holders. The object of the Northern Co. is to secure entire control of the road in the probable event of a foreclosure.

Philadelphia & Reading.—The Union Trust Co., of Philadelphia, announces that it has taken the new car trust

loan of this company, amounting to \$2,000,000. The certificates will bear 6 per cent. interest and will run for 10 years from March 15, one-tenth of the loan to be paid off each year. The Union Trust Co. announces that it has already disposed of about one-third of the loan at par and accrued interest and offers the rest for subscription.

Philadelphia, Wilmington & Baltimore.—This company will put on the road between Philadelphia and Baltimore on April 1 a limited express which will make the run each way in two hours' time, about 25 minutes less time than any train which has hitherto been run over the road. The train will stop only at Wilmington and at the Susquehanna River bridge. The engine will take water from a track-tank which has recently been constructed for this purpose.

Pittsburgh, Fort Wayne & Chicago.—The Philadelphia Ledger says: "The stockholders of the Pittsburgh, Fort Wayne & Chicago Railroad will vote, at a meeting to be held April 8, on a proposition for a new issue of bonds. A circular issued to the stock and bondholders explains that the lease of the road to the Pennsylvania Railroad provides that the stockholders of the leased road shall keep that property in good running order. To pay for the necessary betterments the lessor company has issued to the lessee company for several years special guaranteed stock known as 'betterment stock.' So long as this stock seemed the least burdensome security that could be placed at par the directors of the Pittsburgh, Fort Wayne & Chicago Co. were satisfied to issue it, but when it advanced in market value above par the directors did not feel that they had the right to issue it at par. The result of such an issue, it was stated, would enable the lessee company, by accumulating these issues in a trust or sinking fund, in a few years to outgrow the lessor company in the control of the latter's own property. The issue of the betterment stock was, therefore, stopped, and negotiations have been pending with a view to providing some other form of security to cover the costs of the improvement. At a meeting held in this city the idea was suggested that the existing difficulties could be overcome and both parties to the lease satisfied by making an issue of mortgage bonds in such a manner as would enable the holders of the general or prior stock to exchange their stock for bonds—dollar for dollar—bearing such rate of interest as would equal the dividends on the stock, thus giving the lessee company the desired control of the corporation, while the general stockholders would obtain a mortgage bond guaranteed by the lessee company. Legal difficulties prevented the carrying out of this plan at the time it was suggested. The directors of the Pittsburgh, Fort Wayne & Chicago have decided to submit to the stock and bondholders the proposition to issue such mortgage bonds as have been described, not exceeding \$20,000,000 in amount, the bonds to have 50 years to run, and to be issued from time to time as required to pay for betterments under the terms of the lease with the Pennsylvania Company. Louis H. Meyer, George W. Cass and Charles Lanier are the committee appointed to receive proxies in favor of the proposition. The Pennsylvania Company claims to have made betterments on the leased property amounting to \$3,000,000, for which it has not yet been paid."

Portland & Ogdensburg.—After hearing arguments on the application of the trustees under the mortgage, in Portland, Me., March 24, the Court appointed Gen. S. G. Anderson, the President of the road, Receiver, and decreed that he might issue receiver's certificates to the amount of \$250,000, they to constitute a first lien on the road, the sum thus raised to be devoted entirely to putting the road in a safe condition. The Court also decreed that the Receiver might pay accruing liabilities out of accruing earnings.

Rochester & Pittsburgh.—It is reported that, in consequence of the award of the Grand Trunk coal contracts to parties who will ship most of their coal over this road, trouble has arisen between this company and the New York, Lake Erie & Western. The Erie, it is said, has notified the Rochester & Pittsburgh that its contract for the use of the Erie track between Howard's Crossing, Pa., and Johnsonburg will be abrogated, and that after May 1 it will have no further use of the road. This action is based upon a claim that the Rochester & Pittsburgh Co. has violated its contract by establishing a competing line. Officers of the Rochester & Pittsburgh say, however, that the contract can only be terminated at a year's notice, and also that they have not received any such official notice of any such action on the part of the Erie Co. The section of road which is used by the Rochester & Pittsburgh Co. was a very costly one to build, including the famous Kinzua Viaduct.

The trouble between these two companies, if there is any such trouble as the reports indicate, has arisen from the refusal of the Rochester & Pittsburgh to enter into a pool on the soft coal business with the Erie and the Buffalo, New York & Philadelphia roads. Such a pool was proposed some time ago, but the other companies were not willing to allow the Rochester & Pittsburgh more than 20 per cent. on the coal business to Buffalo and this was refused, that company claiming at least one-third. As above stated nothing official has been given out concerning any trouble between the two roads.

Rome, Watertown & Ogdensburg.—At a meeting of the board of directors in New York last week it was decided to build at once a short branch from Norwood, N. Y., to Massena Springs, the object of which is a connection with the Grand Trunk road. Traffic contracts were also approved with the Portland & Ogdensburg and the Ogdensburg & Lake Champlain roads providing for the interchange of business and for the running of through trains between Portland and Buffalo. The board also voted to buy 3,000 tons of steel rails to be used in renewals.

St. Johnsbury & Lake Champlain.—The stockholders met in St. Johnsbury, Vt., March 20, and unanimously voted to authorize the issue of consolidated mortgage bonds to the amount of \$1,000,000, for the purpose of renewing the road with steel rails and for purchasing additional equipment. This action is taken in anticipation of the increased traffic expected in consequence of the completion of the connecting line between the terminus of this road at Swanton, and the Ogdensburg & Lake Champlain road. Of the consolidated bonds \$600,000 will bear 6 per cent. interest and the balance 5 per cent. There will be \$400,000 issued immediately, the remainder as required.

St. Louis & Cairo.—The High Prairie Branch of this road has been completed. It leaves the main line at Columbia, Ill., and runs through Georgetown to Millstadt, a distance of 14 miles, reaching the High Prairie coal fields, from which considerable traffic is expected. The company is considering the question of building a branch from Jonesboro, Ill., to the Mississippi River opposite Cape Girardeau, a distance of about 50 miles.

Toledo, Cincinnati & St. Louis.—It is reported from Boston that the Court has directed the receiver to abandon the Dayton Division; also that a sale of the Cincinnati Northern Division has been ordered, to take place in 70 days. No official statement has been received.